# Актуарные иллюстративные таблицы и основные соотношения

2016

# Оглавление

# Сложные проценты

## Сложные проценты

***0.5%***

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.005 00 | 0.995 02 | 1.000 0 | 0.995 0 | 0.995 0 | 0.995 0 |
| 2 | 1.010 03 | 0.990 07 | 2.005 0 | 1.985 1 | 2.975 2 | 2.980 1 |
| 3 | 1.015 08 | 0.985 15 | 3.015 0 | 2.970 2 | 5.930 6 | 5.950 4 |
| 4 | 1.020 15 | 0.980 25 | 4.030 1 | 3.950 5 | 9.851 6 | 9.900 9 |
| 5 | 1.025 25 | 0.975 37 | 5.050 3 | 4.925 9 | 14.728 5 | 14.826 7 |
| 6 | 1.030 38 | 0.970 52 | 6.075 5 | 5.896 4 | 20.551 6 | 20.723 1 |
| 7 | 1.035 53 | 0.965 69 | 7.105 9 | 6.862 1 | 27.311 4 | 27.585 2 |
| 8 | 1.040 71 | 0.960 89 | 8.141 4 | 7.823 0 | 34.998 5 | 35.408 2 |
| 9 | 1.045 91 | 0.956 10 | 9.182 1 | 8.779 1 | 43.603 4 | 44.187 2 |
| 10 | 1.051 14 | 0.951 35 | 10.228 0 | 9.730 4 | 53.116 9 | 53.917 6 |
| 11 | 1.056 40 | 0.946 61 | 11.279 2 | 10.677 0 | 63.529 7 | 64.594 7 |
| 12 | 1.061 68 | 0.941 91 | 12.335 6 | 11.618 9 | 74.832 5 | 76.213 6 |
| 13 | 1.066 99 | 0.937 22 | 13.397 2 | 12.556 2 | 87.016 4 | 88.769 7 |
| 14 | 1.072 32 | 0.932 56 | 14.464 2 | 13.488 7 | 100.072 2 | 102.258 4 |
| 15 | 1.077 68 | 0.927 92 | 15.536 5 | 14.416 6 | 113.990 9 | 116.675 1 |
| 16 | 1.083 07 | 0.923 30 | 16.614 2 | 15.339 9 | 128.763 7 | 132.015 0 |
| 17 | 1.088 49 | 0.918 71 | 17.697 3 | 16.258 6 | 144.381 7 | 148.273 6 |
| 18 | 1.093 93 | 0.914 14 | 18.785 8 | 17.172 8 | 160.836 2 | 165.446 4 |
| 19 | 1.099 40 | 0.909 59 | 19.879 7 | 18.082 4 | 178.118 4 | 183.528 8 |
| 20 | 1.104 90 | 0.905 06 | 20.979 1 | 18.987 4 | 196.219 6 | 202.516 2 |
| 21 | 1.110 42 | 0.900 56 | 22.084 0 | 19.888 0 | 215.131 4 | 222.404 1 |
| 22 | 1.115 97 | 0.896 08 | 23.194 4 | 20.784 1 | 234.845 1 | 243.188 2 |
| 23 | 1.121 55 | 0.891 62 | 24.310 4 | 21.675 7 | 255.352 4 | 264.863 9 |
| 24 | 1.127 16 | 0.887 19 | 25.432 0 | 22.562 9 | 276.644 9 | 287.426 8 |
| 25 | 1.132 80 | 0.882 77 | 26.559 1 | 23.445 6 | 298.714 2 | 310.872 4 |
| 26 | 1.138 46 | 0.878 38 | 27.691 9 | 24.324 0 | 321.552 1 | 335.196 4 |
| 27 | 1.144 15 | 0.874 01 | 28.830 4 | 25.198 0 | 345.150 3 | 360.394 4 |
| 28 | 1.149 87 | 0.869 66 | 29.974 5 | 26.067 7 | 369.500 9 | 386.462 1 |
| 29 | 1.155 62 | 0.865 33 | 31.124 4 | 26.933 0 | 394.595 6 | 413.395 2 |
| 30 | 1.161 40 | 0.861 03 | 32.280 0 | 27.794 1 | 420.426 5 | 441.189 2 |
| 31 | 1.167 21 | 0.856 75 | 33.441 4 | 28.650 8 | 446.985 6 | 469.840 0 |
| 32 | 1.173 04 | 0.852 48 | 34.608 6 | 29.503 3 | 474.265 1 | 499.343 3 |
| 33 | 1.178 91 | 0.848 24 | 35.781 7 | 30.351 5 | 502.257 1 | 529.694 8 |
| 34 | 1.184 80 | 0.844 02 | 36.960 6 | 31.195 5 | 530.953 8 | 560.890 4 |
| 35 | 1.190 73 | 0.839 82 | 38.145 4 | 32.035 4 | 560.347 6 | 592.925 7 |
| 36 | 1.196 68 | 0.835 64 | 39.336 1 | 32.871 0 | 590.430 8 | 625.796 8 |
| 37 | 1.202 66 | 0.831 49 | 40.532 8 | 33.702 5 | 621.195 9 | 659.499 3 |
| 38 | 1.208 68 | 0.827 35 | 41.735 4 | 34.529 9 | 652.635 2 | 694.029 1 |
| 39 | 1.214 72 | 0.823 23 | 42.944 1 | 35.353 1 | 684.741 4 | 729.382 2 |
| 40 | 1.220 79 | 0.819 14 | 44.158 8 | 36.172 2 | 717.506 9 | 765.554 4 |
| 41 | 1.226 90 | 0.815 06 | 45.379 6 | 36.987 3 | 750.924 5 | 802.541 7 |
| 42 | 1.233 03 | 0.811 01 | 46.606 5 | 37.798 3 | 784.986 9 | 840.340 0 |
| 43 | 1.239 20 | 0.806 97 | 47.839 6 | 38.605 3 | 819.686 7 | 878.945 3 |
| 44 | 1.245 39 | 0.802 96 | 49.078 8 | 39.408 2 | 855.016 9 | 918.353 5 |
| 45 | 1.251 62 | 0.798 96 | 50.324 2 | 40.207 2 | 890.970 3 | 958.560 7 |
| 46 | 1.257 88 | 0.794 99 | 51.575 8 | 41.002 2 | 927.539 8 | 999.562 9 |
| 47 | 1.264 17 | 0.791 03 | 52.833 7 | 41.793 2 | 964.718 4 | 1 041.356 1 |
| 48 | 1.270 49 | 0.787 10 | 54.097 8 | 42.580 3 | 1 002.499 1 | 1 083.936 4 |
| 49 | 1.276 84 | 0.783 18 | 55.368 3 | 43.363 5 | 1 040.875 1 | 1 127.299 9 |
| 50 | 1.283 23 | 0.779 29 | 56.645 2 | 44.142 8 | 1 079.839 4 | 1 171.442 7 |
| 60 | 1.348 85 | 0.741 37 | 69.770 0 | 51.725 6 | 1 500.371 4 | 1 654.887 8 |
| 70 | 1.417 83 | 0.705 30 | 83.566 1 | 58.939 4 | 1 972.582 2 | 2 212.116 5 |
| 80 | 1.490 34 | 0.670 99 | 98.067 7 | 65.802 3 | 2 490.447 8 | 2 839.538 9 |
| 90 | 1.566 55 | 0.638 34 | 113.310 9 | 72.331 3 | 3 048.408 2 | 3 533.740 1 |
| 100 | 1.646 67 | 0.607 29 | 129.333 7 | 78.542 6 | 3 641.336 1 | 4 291.471 0 |

## Сложные проценты

*1%*

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.010 00 | 0.990 10 | 1.000 0 | 0.990 1 | 0.990 1 | 0.990 1 |
| 2 | 1.020 10 | 0.980 30 | 2.010 0 | 1.970 4 | 2.950 7 | 2.960 5 |
| 3 | 1.030 30 | 0.970 59 | 3.030 1 | 2.941 0 | 5.862 5 | 5.901 5 |
| 4 | 1.040 60 | 0.960 98 | 4.060 4 | 3.902 0 | 9.706 4 | 9.803 4 |
| 5 | 1.051 01 | 0.951 47 | 5.101 0 | 4.853 4 | 14.463 7 | 14.656 9 |
| 6 | 1.061 52 | 0.942 05 | 6.152 0 | 5.795 5 | 20.116 0 | 20.452 4 |
| 7 | 1.072 14 | 0.932 72 | 7.213 5 | 6.728 2 | 26.645 0 | 27.180 5 |
| 8 | 1.082 86 | 0.923 48 | 8.285 7 | 7.651 7 | 34.032 9 | 34.832 2 |
| 9 | 1.093 69 | 0.914 34 | 9.368 5 | 8.566 0 | 42.261 9 | 43.398 2 |
| 10 | 1.104 62 | 0.905 29 | 10.462 2 | 9.471 3 | 51.314 8 | 52.869 5 |
| 11 | 1.115 67 | 0.896 32 | 11.566 8 | 10.367 6 | 61.174 4 | 63.237 2 |
| 12 | 1.126 83 | 0.887 45 | 12.682 5 | 11.255 1 | 71.823 8 | 74.492 3 |
| 13 | 1.138 09 | 0.878 66 | 13.809 3 | 12.133 7 | 83.246 4 | 86.626 0 |
| 14 | 1.149 47 | 0.869 96 | 14.947 4 | 13.003 7 | 95.425 8 | 99.629 7 |
| 15 | 1.160 97 | 0.861 35 | 16.096 9 | 13.865 1 | 108.346 1 | 113.494 7 |
| 16 | 1.172 58 | 0.852 82 | 17.257 9 | 14.717 9 | 121.991 2 | 128.212 6 |
| 17 | 1.184 30 | 0.844 38 | 18.430 4 | 15.562 3 | 136.345 6 | 143.774 9 |
| 18 | 1.196 15 | 0.836 02 | 19.614 7 | 16.398 3 | 151.394 0 | 160.173 1 |
| 19 | 1.208 11 | 0.827 74 | 20.810 9 | 17.226 0 | 167.121 0 | 177.399 2 |
| 20 | 1.220 19 | 0.819 54 | 22.019 0 | 18.045 6 | 183.511 9 | 195.444 7 |
| 21 | 1.232 39 | 0.811 43 | 23.239 2 | 18.857 0 | 200.551 9 | 214.301 7 |
| 22 | 1.244 72 | 0.803 40 | 24.471 6 | 19.660 4 | 218.226 7 | 233.962 1 |
| 23 | 1.257 16 | 0.795 44 | 25.716 3 | 20.455 8 | 236.521 8 | 254.417 9 |
| 24 | 1.269 73 | 0.787 57 | 26.973 5 | 21.243 4 | 255.423 4 | 275.661 3 |
| 25 | 1.282 43 | 0.779 77 | 28.243 2 | 22.023 2 | 274.917 6 | 297.684 4 |
| 26 | 1.295 26 | 0.772 05 | 29.525 6 | 22.795 2 | 294.990 9 | 320.479 6 |
| 27 | 1.308 21 | 0.764 40 | 30.820 9 | 23.559 6 | 315.629 8 | 344.039 2 |
| 28 | 1.321 29 | 0.756 84 | 32.129 1 | 24.316 4 | 336.821 2 | 368.355 7 |
| 29 | 1.334 50 | 0.749 34 | 33.450 4 | 25.065 8 | 358.552 1 | 393.421 5 |
| 30 | 1.347 85 | 0.741 92 | 34.784 9 | 25.807 7 | 380.809 8 | 419.229 2 |
| 31 | 1.361 33 | 0.734 58 | 36.132 7 | 26.542 3 | 403.581 7 | 445.771 5 |
| 32 | 1.374 94 | 0.727 30 | 37.494 1 | 27.269 6 | 426.855 4 | 473.041 1 |
| 33 | 1.388 69 | 0.720 10 | 38.869 0 | 27.989 7 | 450.618 8 | 501.030 7 |
| 34 | 1.402 58 | 0.712 97 | 40.257 7 | 28.702 7 | 474.859 9 | 529.733 4 |
| 35 | 1.416 60 | 0.705 91 | 41.660 3 | 29.408 6 | 499.566 9 | 559.142 0 |
| 36 | 1.430 77 | 0.698 92 | 43.076 9 | 30.107 5 | 524.728 2 | 589.249 5 |
| 37 | 1.445 08 | 0.692 00 | 44.507 6 | 30.799 5 | 550.332 4 | 620.049 0 |
| 38 | 1.459 53 | 0.685 15 | 45.952 7 | 31.484 7 | 576.368 2 | 651.533 7 |
| 39 | 1.474 12 | 0.678 37 | 47.412 3 | 32.163 0 | 602.824 6 | 683.696 7 |
| 40 | 1.488 86 | 0.671 65 | 48.886 4 | 32.834 7 | 629.690 7 | 716.531 4 |
| 41 | 1.503 75 | 0.665 00 | 50.375 2 | 33.499 7 | 656.955 9 | 750.031 1 |
| 42 | 1.518 79 | 0.658 42 | 51.879 0 | 34.158 1 | 684.609 5 | 784.189 2 |
| 43 | 1.533 98 | 0.651 90 | 53.397 8 | 34.810 0 | 712.641 2 | 818.999 2 |
| 44 | 1.549 32 | 0.645 45 | 54.931 8 | 35.455 5 | 741.040 8 | 854.454 6 |
| 45 | 1.564 81 | 0.639 05 | 56.481 1 | 36.094 5 | 769.798 2 | 890.549 2 |
| 46 | 1.580 46 | 0.632 73 | 58.045 9 | 36.727 2 | 798.903 7 | 927.276 4 |
| 47 | 1.596 26 | 0.626 46 | 59.626 3 | 37.353 7 | 828.347 5 | 964.630 1 |
| 48 | 1.612 23 | 0.620 26 | 61.222 6 | 37.974 0 | 858.120 0 | 1 002.604 1 |
| 49 | 1.628 35 | 0.614 12 | 62.834 8 | 38.588 1 | 888.211 8 | 1 041.192 1 |
| 50 | 1.644 63 | 0.608 04 | 64.463 2 | 39.196 1 | 918.613 7 | 1 080.388 2 |
| 60 | 1.816 70 | 0.550 45 | 81.669 7 | 44.955 0 | 1 237.761 2 | 1 504.496 2 |
| 70 | 2.006 76 | 0.498 31 | 100.676 3 | 50.168 5 | 1 578.816 0 | 1 983.148 6 |
| 80 | 2.216 72 | 0.451 12 | 121.671 5 | 54.888 2 | 1 934.765 3 | 2 511.179 4 |
| 90 | 2.448 63 | 0.408 39 | 144.863 3 | 59.160 9 | 2 299.728 4 | 3 083.911 9 |
| 100 | 2.704 81 | 0.369 71 | 170.481 4 | 63.028 9 | 2 668.804 6 | 3 697.112 1 |

## Сложные проценты

***1.5%***

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.015 00 | 0.985 22 | 1.000 0 | 0.985 2 | 0.985 2 | 0.985 2 |
| 2 | 1.030 23 | 0.970 66 | 2.015 0 | 1.955 9 | 2.926 5 | 2.941 1 |
| 3 | 1.045 68 | 0.956 32 | 3.045 2 | 2.912 2 | 5.795 5 | 5.853 3 |
| 4 | 1.061 36 | 0.942 18 | 4.090 9 | 3.854 4 | 9.564 2 | 9.707 7 |
| 5 | 1.077 28 | 0.928 26 | 5.152 3 | 4.782 6 | 14.205 5 | 14.490 3 |
| 6 | 1.093 44 | 0.914 54 | 6.229 6 | 5.697 2 | 19.692 8 | 20.187 5 |
| 7 | 1.109 84 | 0.901 03 | 7.323 0 | 6.598 2 | 26.000 0 | 26.785 7 |
| 8 | 1.126 49 | 0.887 71 | 8.432 8 | 7.485 9 | 33.101 7 | 34.271 7 |
| 9 | 1.143 39 | 0.874 59 | 9.559 3 | 8.360 5 | 40.973 0 | 42.632 2 |
| 10 | 1.160 54 | 0.861 67 | 10.702 7 | 9.222 2 | 49.589 7 | 51.854 4 |
| 11 | 1.177 95 | 0.848 93 | 11.863 3 | 10.071 1 | 58.927 9 | 61.925 5 |
| 12 | 1.195 62 | 0.836 39 | 13.041 2 | 10.907 5 | 68.964 6 | 72.833 0 |
| 13 | 1.213 55 | 0.824 03 | 14.236 8 | 11.731 5 | 79.676 9 | 84.564 5 |
| 14 | 1.231 76 | 0.811 85 | 15.450 4 | 12.543 4 | 91.042 8 | 97.107 9 |
| 15 | 1.250 23 | 0.799 85 | 16.682 1 | 13.343 2 | 103.040 6 | 110.451 1 |
| 16 | 1.268 99 | 0.788 03 | 17.932 4 | 14.131 3 | 115.649 1 | 124.582 4 |
| 17 | 1.288 02 | 0.776 39 | 19.201 4 | 14.907 6 | 128.847 6 | 139.490 0 |
| 18 | 1.307 34 | 0.764 91 | 20.489 4 | 15.672 6 | 142.616 0 | 155.162 6 |
| 19 | 1.326 95 | 0.753 61 | 21.796 7 | 16.426 2 | 156.934 6 | 171.588 8 |
| 20 | 1.346 86 | 0.742 47 | 23.123 7 | 17.168 6 | 171.784 0 | 188.757 4 |
| 21 | 1.367 06 | 0.731 50 | 24.470 5 | 17.900 1 | 187.145 5 | 206.657 6 |
| 22 | 1.387 56 | 0.720 69 | 25.837 6 | 18.620 8 | 203.000 6 | 225.278 4 |
| 23 | 1.408 38 | 0.710 04 | 27.225 1 | 19.330 9 | 219.331 4 | 244.609 2 |
| 24 | 1.429 50 | 0.699 54 | 28.633 5 | 20.030 4 | 236.120 5 | 264.639 6 |
| 25 | 1.450 95 | 0.689 21 | 30.063 0 | 20.719 6 | 253.350 6 | 285.359 3 |
| 26 | 1.472 71 | 0.679 02 | 31.514 0 | 21.398 6 | 271.005 2 | 306.757 9 |
| 27 | 1.494 80 | 0.668 99 | 32.986 7 | 22.067 6 | 289.067 8 | 328.825 5 |
| 28 | 1.517 22 | 0.659 10 | 34.481 5 | 22.726 7 | 307.522 6 | 351.552 2 |
| 29 | 1.539 98 | 0.649 36 | 35.998 7 | 23.376 1 | 326.354 0 | 374.928 3 |
| 30 | 1.563 08 | 0.639 76 | 37.538 7 | 24.015 8 | 345.546 8 | 398.944 1 |
| 31 | 1.586 53 | 0.630 31 | 39.101 8 | 24.646 1 | 365.086 4 | 423.590 3 |
| 32 | 1.610 32 | 0.620 99 | 40.688 3 | 25.267 1 | 384.958 2 | 448.857 4 |
| 33 | 1.634 48 | 0.611 82 | 42.298 6 | 25.879 0 | 405.148 1 | 474.736 4 |
| 34 | 1.659 00 | 0.602 77 | 43.933 1 | 26.481 7 | 425.642 4 | 501.218 1 |
| 35 | 1.683 88 | 0.593 87 | 45.592 1 | 27.075 6 | 446.427 7 | 528.293 7 |
| 36 | 1.709 14 | 0.585 09 | 47.276 0 | 27.660 7 | 467.490 9 | 555.954 4 |
| 37 | 1.734 78 | 0.576 44 | 48.985 1 | 28.237 1 | 488.819 3 | 584.191 5 |
| 38 | 1.760 80 | 0.567 92 | 50.719 9 | 28.805 1 | 510.400 5 | 612.996 6 |
| 39 | 1.787 21 | 0.559 53 | 52.480 7 | 29.364 6 | 532.222 2 | 642.361 1 |
| 40 | 1.814 02 | 0.551 26 | 54.267 9 | 29.915 8 | 554.272 7 | 672.277 0 |
| 41 | 1.841 23 | 0.543 12 | 56.081 9 | 30.459 0 | 576.540 4 | 702.735 9 |
| 42 | 1.868 85 | 0.535 09 | 57.923 1 | 30.994 1 | 599.014 2 | 733.730 0 |
| 43 | 1.896 88 | 0.527 18 | 59.792 0 | 31.521 2 | 621.683 0 | 765.251 2 |
| 44 | 1.925 33 | 0.519 39 | 61.688 9 | 32.040 6 | 644.536 1 | 797.291 9 |
| 45 | 1.954 21 | 0.511 71 | 63.614 2 | 32.552 3 | 667.563 3 | 829.844 2 |
| 46 | 1.983 53 | 0.504 15 | 65.568 4 | 33.056 5 | 690.754 3 | 862.900 7 |
| 47 | 2.013 28 | 0.496 70 | 67.551 9 | 33.553 2 | 714.099 3 | 896.453 9 |
| 48 | 2.043 48 | 0.489 36 | 69.565 2 | 34.042 6 | 737.588 7 | 930.496 4 |
| 49 | 2.074 13 | 0.482 13 | 71.608 7 | 34.524 7 | 761.213 1 | 965.021 1 |
| 50 | 2.105 24 | 0.475 00 | 73.682 8 | 34.999 7 | 784.963 3 | 1 000.020 8 |
| 60 | 2.443 22 | 0.409 30 | 96.214 7 | 39.380 3 | 1 027.547 7 | 1 374.648 7 |
| 70 | 2.835 46 | 0.352 68 | 122.363 8 | 43.154 9 | 1 274.320 7 | 1 789.675 2 |
| 80 | 3.290 66 | 0.303 89 | 152.710 9 | 46.407 3 | 1 519.481 4 | 2 239.511 8 |
| 90 | 3.818 95 | 0.261 85 | 187.929 9 | 49.209 9 | 1 758.753 7 | 2 719.343 0 |
| 100 | 4.432 05 | 0.225 63 | 228.803 0 | 51.624 7 | 1 989.075 3 | 3 225.019 8 |

## Сложные проценты

**2%**

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.020 00 | 0.980 39 | 1.000 0 | 0.980 4 | 0.980 4 | 0.980 4 |
| 2 | 1.040 40 | 0.961 17 | 2.020 0 | 1.941 6 | 2.902 7 | 2.922 0 |
| 3 | 1.061 21 | 0.942 32 | 3.060 4 | 2.883 9 | 5.729 7 | 5.805 8 |
| 4 | 1.082 43 | 0.923 85 | 4.121 6 | 3.807 7 | 9.425 1 | 9.613 6 |
| 5 | 1.104 08 | 0.905 73 | 5.204 0 | 4.713 5 | 13.953 7 | 14.327 0 |
| 6 | 1.126 16 | 0.887 97 | 6.308 1 | 5.601 4 | 19.281 6 | 19.928 5 |
| 7 | 1.148 69 | 0.870 56 | 7.434 3 | 6.472 0 | 25.375 5 | 26.400 4 |
| 8 | 1.171 66 | 0.853 49 | 8.583 0 | 7.325 5 | 32.203 4 | 33.725 9 |
| 9 | 1.195 09 | 0.836 76 | 9.754 6 | 8.162 2 | 39.734 2 | 41.888 2 |
| 10 | 1.218 99 | 0.820 35 | 10.949 7 | 8.982 6 | 47.937 7 | 50.870 7 |
| 11 | 1.243 37 | 0.804 26 | 12.168 7 | 9.786 8 | 56.784 6 | 60.657 6 |
| 12 | 1.268 24 | 0.788 49 | 13.412 1 | 10.575 3 | 66.246 5 | 71.232 9 |
| 13 | 1.293 61 | 0.773 03 | 14.680 3 | 11.348 4 | 76.295 9 | 82.581 3 |
| 14 | 1.319 48 | 0.757 88 | 15.973 9 | 12.106 2 | 86.906 2 | 94.687 6 |
| 15 | 1.345 87 | 0.743 01 | 17.293 4 | 12.849 3 | 98.051 4 | 107.536 8 |
| 16 | 1.372 79 | 0.728 45 | 18.639 3 | 13.577 7 | 109.706 5 | 121.114 5 |
| 17 | 1.400 24 | 0.714 16 | 20.012 1 | 14.291 9 | 121.847 3 | 135.406 4 |
| 18 | 1.428 25 | 0.700 16 | 21.412 3 | 14.992 0 | 134.450 2 | 150.398 4 |
| 19 | 1.456 81 | 0.686 43 | 22.840 6 | 15.678 5 | 147.492 3 | 166.076 9 |
| 20 | 1.485 95 | 0.672 97 | 24.297 4 | 16.351 4 | 160.951 8 | 182.428 3 |
| 21 | 1.515 67 | 0.659 78 | 25.783 3 | 17.011 2 | 174.807 1 | 199.439 5 |
| 22 | 1.545 98 | 0.646 84 | 27.299 0 | 17.658 0 | 189.037 5 | 217.097 6 |
| 23 | 1.576 90 | 0.634 16 | 28.845 0 | 18.292 2 | 203.623 1 | 235.389 8 |
| 24 | 1.608 44 | 0.621 72 | 30.421 9 | 18.913 9 | 218.544 4 | 254.303 7 |
| 25 | 1.640 61 | 0.609 53 | 32.030 3 | 19.523 5 | 233.782 7 | 273.827 2 |
| 26 | 1.673 42 | 0.597 58 | 33.670 9 | 20.121 0 | 249.319 8 | 293.948 2 |
| 27 | 1.706 89 | 0.585 86 | 35.344 3 | 20.706 9 | 265.138 0 | 314.655 1 |
| 28 | 1.741 02 | 0.574 37 | 37.051 2 | 21.281 3 | 281.220 5 | 335.936 4 |
| 29 | 1.775 84 | 0.563 11 | 38.792 2 | 21.844 4 | 297.550 8 | 357.780 8 |
| 30 | 1.811 36 | 0.552 07 | 40.568 1 | 22.396 5 | 314.112 9 | 380.177 2 |
| 31 | 1.847 59 | 0.541 25 | 42.379 4 | 22.937 7 | 330.891 5 | 403.114 9 |
| 32 | 1.884 54 | 0.530 63 | 44.227 0 | 23.468 3 | 347.871 8 | 426.583 3 |
| 33 | 1.922 23 | 0.520 23 | 46.111 6 | 23.988 6 | 365.039 3 | 450.571 8 |
| 34 | 1.960 68 | 0.510 03 | 48.033 8 | 24.498 6 | 382.380 3 | 475.070 4 |
| 35 | 1.999 89 | 0.500 03 | 49.994 5 | 24.998 6 | 399.881 3 | 500.069 0 |
| 36 | 2.039 89 | 0.490 22 | 51.994 4 | 25.488 8 | 417.529 3 | 525.557 9 |
| 37 | 2.080 69 | 0.480 61 | 54.034 3 | 25.969 5 | 435.311 9 | 551.527 3 |
| 38 | 2.122 30 | 0.471 19 | 56.114 9 | 26.440 6 | 453.217 0 | 577.968 0 |
| 39 | 2.164 74 | 0.461 95 | 58.237 2 | 26.902 6 | 471.233 0 | 604.870 6 |
| 40 | 2.208 04 | 0.452 89 | 60.402 0 | 27.355 5 | 489.348 6 | 632.226 0 |
| 41 | 2.252 20 | 0.444 01 | 62.610 0 | 27.799 5 | 507.553 0 | 660.025 5 |
| 42 | 2.297 24 | 0.435 30 | 64.862 2 | 28.234 8 | 525.835 8 | 688.260 3 |
| 43 | 2.343 19 | 0.426 77 | 67.159 5 | 28.661 6 | 544.186 9 | 716.921 9 |
| 44 | 2.390 05 | 0.418 40 | 69.502 7 | 29.080 0 | 562.596 5 | 746.001 8 |
| 45 | 2.437 85 | 0.410 20 | 71.892 7 | 29.490 2 | 581.055 3 | 775.492 0 |
| 46 | 2.486 61 | 0.402 15 | 74.330 6 | 29.892 3 | 599.554 4 | 805.384 3 |
| 47 | 2.536 34 | 0.394 27 | 76.817 2 | 30.286 6 | 618.085 0 | 835.670 9 |
| 48 | 2.587 07 | 0.386 54 | 79.353 5 | 30.673 1 | 636.638 8 | 866.344 0 |
| 49 | 2.638 81 | 0.378 96 | 81.940 6 | 31.052 1 | 655.207 8 | 897.396 1 |
| 50 | 2.691 59 | 0.371 53 | 84.579 4 | 31.423 6 | 673.784 2 | 928.819 7 |
| 60 | 3.281 03 | 0.304 78 | 114.051 5 | 34.760 9 | 858.458 4 | 1 261.955 7 |
| 70 | 3.999 56 | 0.250 03 | 149.977 9 | 37.498 6 | 1 037.332 9 | 1 625.069 0 |
| 80 | 4.875 44 | 0.205 11 | 193.772 0 | 39.744 5 | 1 206.531 3 | 2 012.774 3 |
| 90 | 5.943 13 | 0.168 26 | 247.156 7 | 41.586 9 | 1 363.757 0 | 2 420.653 5 |
| 100 | 7.244 65 | 0.138 03 | 312.232 3 | 43.098 4 | 1 507.851 1 | 2 845.082 4 |

## Сложные проценты

***2.5%***

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.025 00 | 0.975 61 | 1.000 0 | 0.975 6 | 0.975 6 | 0.975 6 |
| 2 | 1.050 63 | 0.951 81 | 2.025 0 | 1.927 4 | 2.879 2 | 2.903 0 |
| 3 | 1.076 89 | 0.928 60 | 3.075 6 | 2.856 0 | 5.665 0 | 5.759 1 |
| 4 | 1.103 81 | 0.905 95 | 4.152 5 | 3.762 0 | 9.288 8 | 9.521 0 |
| 5 | 1.131 41 | 0.883 85 | 5.256 3 | 4.645 8 | 13.708 1 | 14.166 9 |
| 6 | 1.159 69 | 0.862 30 | 6.387 7 | 5.508 1 | 18.881 9 | 19.675 0 |
| 7 | 1.188 69 | 0.841 27 | 7.547 4 | 6.349 4 | 24.770 7 | 26.024 4 |
| 8 | 1.218 40 | 0.820 75 | 8.736 1 | 7.170 1 | 31.336 7 | 33.194 5 |
| 9 | 1.248 86 | 0.800 73 | 9.954 5 | 7.970 9 | 38.543 3 | 41.165 4 |
| 10 | 1.280 08 | 0.781 20 | 11.203 4 | 8.752 1 | 46.355 3 | 49.917 4 |
| 11 | 1.312 09 | 0.762 14 | 12.483 5 | 9.514 2 | 54.738 9 | 59.431 7 |
| 12 | 1.344 89 | 0.743 56 | 13.795 6 | 10.257 8 | 63.661 5 | 69.689 4 |
| 13 | 1.378 51 | 0.725 42 | 15.140 4 | 10.983 2 | 73.092 0 | 80.672 6 |
| 14 | 1.412 97 | 0.707 73 | 16.519 0 | 11.690 9 | 83.000 2 | 92.363 5 |
| 15 | 1.448 30 | 0.690 47 | 17.931 9 | 12.381 4 | 93.357 2 | 104.744 9 |
| 16 | 1.484 51 | 0.673 62 | 19.380 2 | 13.055 0 | 104.135 2 | 117.799 9 |
| 17 | 1.521 62 | 0.657 20 | 20.864 7 | 13.712 2 | 115.307 5 | 131.512 1 |
| 18 | 1.559 66 | 0.641 17 | 22.386 3 | 14.353 4 | 126.848 5 | 145.865 5 |
| 19 | 1.598 65 | 0.625 53 | 23.946 0 | 14.978 9 | 138.733 5 | 160.844 3 |
| 20 | 1.638 62 | 0.610 27 | 25.544 7 | 15.589 2 | 150.938 9 | 176.433 5 |
| 21 | 1.679 58 | 0.595 39 | 27.183 3 | 16.184 5 | 163.442 0 | 192.618 1 |
| 22 | 1.721 57 | 0.580 86 | 28.862 9 | 16.765 4 | 176.221 0 | 209.383 5 |
| 23 | 1.764 61 | 0.566 70 | 30.584 4 | 17.332 1 | 189.255 1 | 226.715 6 |
| 24 | 1.808 73 | 0.552 88 | 32.349 0 | 17.885 0 | 202.524 1 | 244.600 6 |
| 25 | 1.853 94 | 0.539 39 | 34.157 8 | 18.424 4 | 216.008 8 | 263.024 9 |
| 26 | 1.900 29 | 0.526 23 | 36.011 7 | 18.950 6 | 229.690 9 | 281.975 6 |
| 27 | 1.947 80 | 0.513 40 | 37.912 0 | 19.464 0 | 243.552 7 | 301.439 6 |
| 28 | 1.996 50 | 0.500 88 | 39.859 8 | 19.964 9 | 257.577 3 | 321.404 5 |
| 29 | 2.046 41 | 0.488 66 | 41.856 3 | 20.453 5 | 271.748 5 | 341.858 0 |
| 30 | 2.097 57 | 0.476 74 | 43.902 7 | 20.930 3 | 286.050 8 | 362.788 3 |
| 31 | 2.150 01 | 0.465 11 | 46.000 3 | 21.395 4 | 300.469 3 | 384.183 7 |
| 32 | 2.203 76 | 0.453 77 | 48.150 3 | 21.849 2 | 314.990 0 | 406.032 9 |
| 33 | 2.258 85 | 0.442 70 | 50.354 0 | 22.291 9 | 329.599 2 | 428.324 8 |
| 34 | 2.315 32 | 0.431 91 | 52.612 9 | 22.723 8 | 344.284 0 | 451.048 5 |
| 35 | 2.373 21 | 0.421 37 | 54.928 2 | 23.145 2 | 359.032 0 | 474.193 7 |
| 36 | 2.432 54 | 0.411 09 | 57.301 4 | 23.556 3 | 373.831 3 | 497.750 0 |
| 37 | 2.493 35 | 0.401 07 | 59.733 9 | 23.957 3 | 388.670 8 | 521.707 3 |
| 38 | 2.555 68 | 0.391 28 | 62.227 3 | 24.348 6 | 403.539 6 | 546.055 9 |
| 39 | 2.619 57 | 0.381 74 | 64.783 0 | 24.730 3 | 418.427 6 | 570.786 2 |
| 40 | 2.685 06 | 0.372 43 | 67.402 6 | 25.102 8 | 433.324 8 | 595.889 0 |
| 41 | 2.752 19 | 0.363 35 | 70.087 6 | 25.466 1 | 448.222 0 | 621.355 1 |
| 42 | 2.821 00 | 0.354 48 | 72.839 8 | 25.820 6 | 463.110 4 | 647.175 7 |
| 43 | 2.891 52 | 0.345 84 | 75.660 8 | 26.166 4 | 477.981 4 | 673.342 2 |
| 44 | 2.963 81 | 0.337 40 | 78.552 3 | 26.503 8 | 492.827 2 | 699.846 0 |
| 45 | 3.037 90 | 0.329 17 | 81.516 1 | 26.833 0 | 507.640 1 | 726.679 0 |
| 46 | 3.113 85 | 0.321 15 | 84.554 0 | 27.154 2 | 522.412 8 | 753.833 2 |
| 47 | 3.191 70 | 0.313 31 | 87.667 9 | 27.467 5 | 537.138 5 | 781.300 7 |
| 48 | 3.271 49 | 0.305 67 | 90.859 6 | 27.773 2 | 551.810 7 | 809.073 9 |
| 49 | 3.353 28 | 0.298 22 | 94.131 1 | 28.071 4 | 566.423 3 | 837.145 2 |
| 50 | 3.437 11 | 0.290 94 | 97.484 3 | 28.362 3 | 580.970 4 | 865.507 5 |
| 60 | 4.399 79 | 0.227 28 | 135.991 6 | 30.908 7 | 721.774 3 | 1 163.653 7 |
| 70 | 5.632 10 | 0.177 55 | 185.284 1 | 32.897 9 | 851.662 1 | 1 484.085 7 |
| 80 | 7.209 57 | 0.138 70 | 248.382 7 | 34.451 8 | 968.669 9 | 1 821.927 3 |
| 90 | 9.228 86 | 0.108 36 | 329.154 3 | 35.665 8 | 1 072.215 7 | 2 173.369 3 |
| 100 | 11.813 72 | 0.084 65 | 432.548 7 | 36.614 1 | 1 162.588 8 | 2 535.435 8 |

## Сложные проценты

*3%*

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.030 00 | 0.970 87 | 1.000 0 | 0.970 9 | 0.970 9 | 0.970 9 |
| 2 | 1.060 90 | 0.942 60 | 2.030 0 | 1.913 5 | 2.856 1 | 2.884 3 |
| 3 | 1.092 73 | 0.915 14 | 3.090 9 | 2.828 6 | 5.601 5 | 5.713 0 |
| 4 | 1.125 51 | 0.888 49 | 4.183 6 | 3.717 1 | 9.155 4 | 9.430 1 |
| 5 | 1.159 27 | 0.862 61 | 5.309 1 | 4.579 7 | 13.468 5 | 14.009 8 |
| 6 | 1.194 05 | 0.837 48 | 6.468 4 | 5.417 2 | 18.493 4 | 19.427 0 |
| 7 | 1.229 87 | 0.813 09 | 7.662 5 | 6.230 3 | 24.185 0 | 25.657 2 |
| 8 | 1.266 77 | 0.789 41 | 8.892 3 | 7.019 7 | 30.500 3 | 32.676 9 |
| 9 | 1.304 77 | 0.766 42 | 10.159 1 | 7.786 1 | 37.398 1 | 40.463 0 |
| 10 | 1.343 92 | 0.744 09 | 11.463 9 | 8.530 2 | 44.839 0 | 48.993 2 |
| 11 | 1.384 23 | 0.722 42 | 12.807 8 | 9.252 6 | 52.785 6 | 58.245 9 |
| 12 | 1.425 76 | 0.701 38 | 14.192 0 | 9.954 0 | 61.202 2 | 68.199 9 |
| 13 | 1.468 53 | 0.680 95 | 15.617 8 | 10.635 0 | 70.054 6 | 78.834 8 |
| 14 | 1.512 59 | 0.661 12 | 17.086 3 | 11.296 1 | 79.310 2 | 90.130 9 |
| 15 | 1.557 97 | 0.641 86 | 18.598 9 | 11.937 9 | 88.938 1 | 102.068 8 |
| 16 | 1.604 71 | 0.623 17 | 20.156 9 | 12.561 1 | 98.908 8 | 114.629 9 |
| 17 | 1.652 85 | 0.605 02 | 21.761 6 | 13.166 1 | 109.194 1 | 127.796 1 |
| 18 | 1.702 43 | 0.587 39 | 23.414 4 | 13.753 5 | 119.767 2 | 141.549 6 |
| 19 | 1.753 51 | 0.570 29 | 25.116 9 | 14.323 8 | 130.602 6 | 155.873 4 |
| 20 | 1.806 11 | 0.553 68 | 26.870 4 | 14.877 5 | 141.676 1 | 170.750 8 |
| 21 | 1.860 29 | 0.537 55 | 28.676 5 | 15.415 0 | 152.964 7 | 186.165 9 |
| 22 | 1.916 10 | 0.521 89 | 30.536 8 | 15.936 9 | 164.446 3 | 202.102 8 |
| 23 | 1.973 59 | 0.506 69 | 32.452 9 | 16.443 6 | 176.100 2 | 218.546 4 |
| 24 | 2.032 79 | 0.491 93 | 34.426 5 | 16.935 5 | 187.906 6 | 235.481 9 |
| 25 | 2.093 78 | 0.477 61 | 36.459 3 | 17.413 1 | 199.846 8 | 252.895 1 |
| 26 | 2.156 59 | 0.463 69 | 38.553 0 | 17.876 8 | 211.902 8 | 270.771 9 |
| 27 | 2.221 29 | 0.450 19 | 40.709 6 | 18.327 0 | 224.057 9 | 289.099 0 |
| 28 | 2.287 93 | 0.437 08 | 42.930 9 | 18.764 1 | 236.296 1 | 307.863 1 |
| 29 | 2.356 57 | 0.424 35 | 45.218 9 | 19.188 5 | 248.602 1 | 327.051 5 |
| 30 | 2.427 26 | 0.411 99 | 47.575 4 | 19.600 4 | 260.961 7 | 346.652 0 |
| 31 | 2.500 08 | 0.399 99 | 50.002 7 | 20.000 4 | 273.361 3 | 366.652 4 |
| 32 | 2.575 08 | 0.388 34 | 52.502 8 | 20.388 8 | 285.788 1 | 387.041 1 |
| 33 | 2.652 34 | 0.377 03 | 55.077 8 | 20.765 8 | 298.230 0 | 407.806 9 |
| 34 | 2.731 91 | 0.366 04 | 57.730 2 | 21.131 8 | 310.675 5 | 428.938 8 |
| 35 | 2.813 86 | 0.355 38 | 60.462 1 | 21.487 2 | 323.113 9 | 450.426 0 |
| 36 | 2.898 28 | 0.345 03 | 63.275 9 | 21.832 3 | 335.535 1 | 472.258 3 |
| 37 | 2.985 23 | 0.334 98 | 66.174 2 | 22.167 2 | 347.929 5 | 494.425 5 |
| 38 | 3.074 78 | 0.325 23 | 69.159 4 | 22.492 5 | 360.288 1 | 516.917 9 |
| 39 | 3.167 03 | 0.315 75 | 72.234 2 | 22.808 2 | 372.602 4 | 539.726 2 |
| 40 | 3.262 04 | 0.306 56 | 75.401 3 | 23.114 8 | 384.864 7 | 562.840 9 |
| 41 | 3.359 90 | 0.297 63 | 78.663 3 | 23.412 4 | 397.067 5 | 586.253 3 |
| 42 | 3.460 70 | 0.288 96 | 82.023 2 | 23.701 4 | 409.203 8 | 609.954 7 |
| 43 | 3.564 52 | 0.280 54 | 85.483 9 | 23.981 9 | 421.267 1 | 633.936 6 |
| 44 | 3.671 45 | 0.272 37 | 89.048 4 | 24.254 3 | 433.251 5 | 658.190 9 |
| 45 | 3.781 60 | 0.264 44 | 92.719 9 | 24.518 7 | 445.151 2 | 682.709 6 |
| 46 | 3.895 04 | 0.256 74 | 96.501 5 | 24.775 4 | 456.961 1 | 707.485 0 |
| 47 | 4.011 90 | 0.249 26 | 100.396 5 | 25.024 7 | 468.676 2 | 732.509 7 |
| 48 | 4.132 25 | 0.242 00 | 104.408 4 | 25.266 7 | 480.292 2 | 757.776 4 |
| 49 | 4.256 22 | 0.234 95 | 108.540 6 | 25.501 7 | 491.804 7 | 783.278 1 |
| 50 | 4.383 91 | 0.228 11 | 112.796 9 | 25.729 8 | 503.210 1 | 809.007 9 |
| 60 | 5.891 60 | 0.169 73 | 163.053 4 | 27.675 6 | 610.728 2 | 1 077.481 2 |
| 70 | 7.917 82 | 0.126 30 | 230.594 1 | 29.123 4 | 705.210 3 | 1 362.552 6 |
| 80 | 10.640 89 | 0.093 98 | 321.363 0 | 30.200 8 | 786.287 3 | 1 659.974 6 |
| 90 | 14.300 47 | 0.069 93 | 443.348 9 | 31.002 4 | 854.632 6 | 1 966.586 4 |
| 100 | 19.218 63 | 0.052 03 | 607.287 7 | 31.598 9 | 911.453 0 | 2 280.036 5 |

## Сложные проценты

*4%*

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.040 00 | 0.961 54 | 1.000 0 | 0.961 5 | 0.961 5 | 0.961 5 |
| 2 | 1.081 60 | 0.924 56 | 2.040 0 | 1.886 1 | 2.810 7 | 2.847 6 |
| 3 | 1.124 86 | 0.889 00 | 3.121 6 | 2.775 1 | 5.477 6 | 5.622 7 |
| 4 | 1.169 86 | 0.854 80 | 4.246 5 | 3.629 9 | 8.896 9 | 9.252 6 |
| 5 | 1.216 65 | 0.821 93 | 5.416 3 | 4.451 8 | 13.006 5 | 13.704 4 |
| 6 | 1.265 32 | 0.790 31 | 6.633 0 | 5.242 1 | 17.748 4 | 18.946 6 |
| 7 | 1.315 93 | 0.759 92 | 7.898 3 | 6.002 1 | 23.067 8 | 24.948 6 |
| 8 | 1.368 57 | 0.730 69 | 9.214 2 | 6.732 7 | 28.913 3 | 31.681 4 |
| 9 | 1.423 31 | 0.702 59 | 10.582 8 | 7.435 3 | 35.236 6 | 39.116 7 |
| 10 | 1.480 24 | 0.675 56 | 12.006 1 | 8.110 9 | 41.992 2 | 47.227 6 |
| 11 | 1.539 45 | 0.649 58 | 13.486 4 | 8.760 5 | 49.137 6 | 55.988 1 |
| 12 | 1.601 03 | 0.624 60 | 15.025 8 | 9.385 1 | 56.632 8 | 65.373 2 |
| 13 | 1.665 07 | 0.600 57 | 16.626 8 | 9.985 6 | 64.440 3 | 75.358 8 |
| 14 | 1.731 68 | 0.577 48 | 18.291 9 | 10.563 1 | 72.524 9 | 85.921 9 |
| 15 | 1.800 94 | 0.555 26 | 20.023 6 | 11.118 4 | 80.853 9 | 97.040 3 |
| 16 | 1.872 98 | 0.533 91 | 21.824 5 | 11.652 3 | 89.396 4 | 108.692 6 |
| 17 | 1.947 90 | 0.513 37 | 23.697 5 | 12.165 7 | 98.123 8 | 120.858 3 |
| 18 | 2.025 82 | 0.493 63 | 25.645 4 | 12.659 3 | 107.009 1 | 133.517 6 |
| 19 | 2.106 85 | 0.474 64 | 27.671 2 | 13.133 9 | 116.027 3 | 146.651 5 |
| 20 | 2.191 12 | 0.456 39 | 29.778 1 | 13.590 3 | 125.155 0 | 160.241 8 |
| 21 | 2.278 77 | 0.438 83 | 31.969 2 | 14.029 2 | 134.370 5 | 174.271 0 |
| 22 | 2.369 92 | 0.421 96 | 34.248 0 | 14.451 1 | 143.653 5 | 188.722 1 |
| 23 | 2.464 72 | 0.405 73 | 36.617 9 | 14.856 8 | 152.985 2 | 203.579 0 |
| 24 | 2.563 30 | 0.390 12 | 39.082 6 | 15.247 0 | 162.348 2 | 218.825 9 |
| 25 | 2.665 84 | 0.375 12 | 41.645 9 | 15.622 1 | 171.726 1 | 234.448 0 |
| 26 | 2.772 47 | 0.360 69 | 44.311 7 | 15.982 8 | 181.104 0 | 250.430 8 |
| 27 | 2.883 37 | 0.346 82 | 47.084 2 | 16.329 6 | 190.468 0 | 266.760 4 |
| 28 | 2.998 70 | 0.333 48 | 49.967 6 | 16.663 1 | 199.805 4 | 283.423 4 |
| 29 | 3.118 65 | 0.320 65 | 52.966 3 | 16.983 7 | 209.104 3 | 300.407 1 |
| 30 | 3.243 40 | 0.308 32 | 56.084 9 | 17.292 0 | 218.353 9 | 317.699 2 |
| 31 | 3.373 13 | 0.296 46 | 59.328 3 | 17.588 5 | 227.544 1 | 335.287 7 |
| 32 | 3.508 06 | 0.285 06 | 62.701 5 | 17.873 6 | 236.666 0 | 353.161 2 |
| 33 | 3.648 38 | 0.274 09 | 66.209 5 | 18.147 6 | 245.711 1 | 371.308 9 |
| 34 | 3.794 32 | 0.263 55 | 69.857 9 | 18.411 2 | 254.671 9 | 389.720 1 |
| 35 | 3.946 09 | 0.253 42 | 73.652 2 | 18.664 6 | 263.541 4 | 408.384 7 |
| 36 | 4.103 93 | 0.243 67 | 77.598 3 | 18.908 3 | 272.313 5 | 427.293 0 |
| 37 | 4.268 09 | 0.234 30 | 81.702 2 | 19.142 6 | 280.982 5 | 446.435 5 |
| 38 | 4.438 81 | 0.225 29 | 85.970 3 | 19.367 9 | 289.543 3 | 465.803 4 |
| 39 | 4.616 37 | 0.216 62 | 90.409 1 | 19.584 5 | 297.991 5 | 485.387 9 |
| 40 | 4.801 02 | 0.208 29 | 95.025 5 | 19.792 8 | 306.323 1 | 505.180 7 |
| 41 | 4.993 06 | 0.200 28 | 99.826 5 | 19.993 1 | 314.534 5 | 525.173 7 |
| 42 | 5.192 78 | 0.192 57 | 104.819 6 | 20.185 6 | 322.622 6 | 545.359 3 |
| 43 | 5.400 50 | 0.185 17 | 110.012 4 | 20.370 8 | 330.584 9 | 565.730 1 |
| 44 | 5.616 52 | 0.178 05 | 115.412 9 | 20.548 8 | 338.418 9 | 586.279 0 |
| 45 | 5.841 18 | 0.171 20 | 121.029 4 | 20.720 0 | 346.122 8 | 606.999 0 |
| 46 | 6.074 82 | 0.164 61 | 126.870 6 | 20.884 7 | 353.695 1 | 627.883 7 |
| 47 | 6.317 82 | 0.158 28 | 132.945 4 | 21.042 9 | 361.134 3 | 648.926 6 |
| 48 | 6.570 53 | 0.152 19 | 139.263 2 | 21.195 1 | 368.439 7 | 670.121 7 |
| 49 | 6.833 35 | 0.146 34 | 145.833 7 | 21.341 5 | 375.610 4 | 691.463 2 |
| 50 | 7.106 68 | 0.140 71 | 152.667 1 | 21.482 2 | 382.646 0 | 712.945 4 |
| 60 | 10.519 63 | 0.095 06 | 237.990 7 | 22.623 5 | 445.620 1 | 934.412 8 |
| 70 | 15.571 62 | 0.064 22 | 364.290 5 | 23.394 5 | 495.873 4 | 1 165.137 1 |
| 80 | 23.049 80 | 0.043 38 | 551.245 0 | 23.915 4 | 535.031 5 | 1 402.115 2 |
| 90 | 34.119 33 | 0.029 31 | 827.983 3 | 24.267 3 | 565.004 2 | 1 643.318 1 |
| 100 | 50.504 95 | 0.019 80 | 1 237.623 7 | 24.505 0 | 587.629 9 | 1 887.375 0 |

## Сложные проценты

***5%***

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.050 00 | 0.952 38 | 1.000 0 | 0.952 4 | 0.952 4 | 0.952 4 |
| 2 | 1.102 50 | 0.907 03 | 2.050 0 | 1.859 4 | 2.766 4 | 2.811 8 |
| 3 | 1.157 63 | 0.863 84 | 3.152 5 | 2.723 2 | 5.358 0 | 5.535 0 |
| 4 | 1.215 51 | 0.822 70 | 4.310 1 | 3.546 0 | 8.648 8 | 9.081 0 |
| 5 | 1.276 28 | 0.783 53 | 5.525 6 | 4.329 5 | 12.566 4 | 13.410 5 |
| 6 | 1.340 10 | 0.746 22 | 6.801 9 | 5.075 7 | 17.043 7 | 18.486 2 |
| 7 | 1.407 10 | 0.710 68 | 8.142 0 | 5.786 4 | 22.018 5 | 24.272 5 |
| 8 | 1.477 46 | 0.676 84 | 9.549 1 | 6.463 2 | 27.433 2 | 30.735 7 |
| 9 | 1.551 33 | 0.644 61 | 11.026 6 | 7.107 8 | 33.234 7 | 37.843 6 |
| 10 | 1.628 89 | 0.613 91 | 12.577 9 | 7.721 7 | 39.373 8 | 45.565 3 |
| 11 | 1.710 34 | 0.584 68 | 14.206 8 | 8.306 4 | 45.805 3 | 53.871 7 |
| 12 | 1.795 86 | 0.556 84 | 15.917 1 | 8.863 3 | 52.487 3 | 62.735 0 |
| 13 | 1.885 65 | 0.530 32 | 17.713 0 | 9.393 6 | 59.381 5 | 72.128 5 |
| 14 | 1.979 93 | 0.505 07 | 19.598 6 | 9.898 6 | 66.452 4 | 82.027 2 |
| 15 | 2.078 93 | 0.481 02 | 21.578 6 | 10.379 7 | 73.667 7 | 92.406 8 |
| 16 | 2.182 87 | 0.458 11 | 23.657 5 | 10.837 8 | 80.997 5 | 103.244 6 |
| 17 | 2.292 02 | 0.436 30 | 25.840 4 | 11.274 1 | 88.414 5 | 114.518 7 |
| 18 | 2.406 62 | 0.415 52 | 28.132 4 | 11.689 6 | 95.893 9 | 126.208 3 |
| 19 | 2.526 95 | 0.395 73 | 30.539 0 | 12.085 3 | 103.412 8 | 138.293 6 |
| 20 | 2.653 30 | 0.376 89 | 33.066 0 | 12.462 2 | 110.950 6 | 150.755 8 |
| 21 | 2.785 96 | 0.358 94 | 35.719 3 | 12.821 2 | 118.488 4 | 163.576 9 |
| 22 | 2.925 26 | 0.341 85 | 38.505 2 | 13.163 0 | 126.009 1 | 176.739 9 |
| 23 | 3.071 52 | 0.325 57 | 41.430 5 | 13.488 6 | 133.497 3 | 190.228 5 |
| 24 | 3.225 10 | 0.310 07 | 44.502 0 | 13.798 6 | 140.938 9 | 204.027 2 |
| 25 | 3.386 35 | 0.295 30 | 47.727 1 | 14.093 9 | 148.321 5 | 218.121 1 |
| 26 | 3.555 67 | 0.281 24 | 51.113 5 | 14.375 2 | 155.633 7 | 232.496 3 |
| 27 | 3.733 46 | 0.267 85 | 54.669 1 | 14.643 0 | 162.865 6 | 247.139 3 |
| 28 | 3.920 13 | 0.255 09 | 58.402 6 | 14.898 1 | 170.008 2 | 262.037 5 |
| 29 | 4.116 14 | 0.242 95 | 62.322 7 | 15.141 1 | 177.053 7 | 277.178 5 |
| 30 | 4.321 94 | 0.231 38 | 66.438 8 | 15.372 5 | 183.995 0 | 292.551 0 |
| 31 | 4.538 04 | 0.220 36 | 70.760 8 | 15.592 8 | 190.826 1 | 308.143 8 |
| 32 | 4.764 94 | 0.209 87 | 75.298 8 | 15.802 7 | 197.541 9 | 323.946 5 |
| 33 | 5.003 19 | 0.199 87 | 80.063 8 | 16.002 5 | 204.137 7 | 339.949 0 |
| 34 | 5.253 35 | 0.190 35 | 85.067 0 | 16.192 9 | 210.609 7 | 356.141 9 |
| 35 | 5.516 02 | 0.181 29 | 90.320 3 | 16.374 2 | 216.954 9 | 372.516 1 |
| 36 | 5.791 82 | 0.172 66 | 95.836 3 | 16.546 9 | 223.170 5 | 389.063 0 |
| 37 | 6.081 41 | 0.164 44 | 101.628 1 | 16.711 3 | 229.254 7 | 405.774 3 |
| 38 | 6.385 48 | 0.156 61 | 107.709 5 | 16.867 9 | 235.205 7 | 422.642 1 |
| 39 | 6.704 75 | 0.149 15 | 114.095 0 | 17.017 0 | 241.022 4 | 439.659 2 |
| 40 | 7.039 99 | 0.142 05 | 120.799 8 | 17.159 1 | 246.704 3 | 456.818 3 |
| 41 | 7.391 99 | 0.135 28 | 127.839 8 | 17.294 4 | 252.250 8 | 474.112 6 |
| 42 | 7.761 59 | 0.128 84 | 135.231 8 | 17.423 2 | 257.662 1 | 491.535 8 |
| 43 | 8.149 67 | 0.122 70 | 142.993 3 | 17.545 9 | 262.938 4 | 509.081 8 |
| 44 | 8.557 15 | 0.116 86 | 151.143 0 | 17.662 8 | 268.080 3 | 526.744 5 |
| 45 | 8.985 01 | 0.111 30 | 159.700 2 | 17.774 1 | 273.088 6 | 544.518 6 |
| 46 | 9.434 26 | 0.106 00 | 168.685 2 | 17.880 1 | 277.964 5 | 562.398 7 |
| 47 | 9.905 97 | 0.100 95 | 178.119 4 | 17.981 0 | 282.709 1 | 580.379 7 |
| 48 | 10.401 27 | 0.096 14 | 188.025 4 | 18.077 2 | 287.323 9 | 598.456 8 |
| 49 | 10.921 33 | 0.091 56 | 198.426 7 | 18.168 7 | 291.810 5 | 616.625 6 |
| 50 | 11.467 40 | 0.087 20 | 209.348 0 | 18.255 9 | 296.170 7 | 634.881 5 |
| 60 | 18.679 19 | 0.053 54 | 353.583 7 | 18.929 3 | 333.272 5 | 821.414 2 |
| 70 | 30.426 43 | 0.032 87 | 588.528 5 | 19.342 7 | 360.183 6 | 1 013.146 5 |
| 80 | 49.561 44 | 0.020 18 | 971.228 8 | 19.596 5 | 379.242 5 | 1 208.070 8 |
| 90 | 80.730 37 | 0.012 39 | 1 594.607 3 | 19.752 3 | 392.501 1 | 1 404.954 8 |
| 100 | 131.501 26 | 0.007 60 | 2 610.025 2 | 19.847 9 | 401.597 1 | 1 603.041 8 |

## Сложные проценты

*6%*

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.060 00 | 0.943 40 | 1.000 0 | 0.943 4 | 0.943 4 | 0.943 4 |
| 2 | 1.123 60 | 0.890 00 | 2.060 0 | 1.833 4 | 2.723 4 | 2.776 8 |
| 3 | 1.191 02 | 0.839 62 | 3.183 6 | 2.673 0 | 5.242 2 | 5.449 8 |
| 4 | 1.262 48 | 0.792 09 | 4.374 6 | 3.465 1 | 8.410 6 | 8.914 9 |
| 5 | 1.338 23 | 0.747 26 | 5.637 1 | 4.212 4 | 12.146 9 | 13.127 3 |
| 6 | 1.418 52 | 0.704 96 | 6.975 3 | 4.917 3 | 16.376 7 | 18.044 6 |
| 7 | 1.503 63 | 0.665 06 | 8.393 8 | 5.582 4 | 21.032 1 | 23.627 0 |
| 8 | 1.593 85 | 0.627 41 | 9.897 5 | 6.209 8 | 26.051 4 | 29.836 8 |
| 9 | 1.689 48 | 0.591 90 | 11.491 3 | 6.801 7 | 31.378 5 | 36.638 5 |
| 10 | 1.790 85 | 0.558 39 | 13.180 8 | 7.360 1 | 36.962 4 | 43.998 5 |
| 11 | 1.898 30 | 0.526 79 | 14.971 6 | 7.886 9 | 42.757 1 | 51.885 4 |
| 12 | 2.012 20 | 0.496 97 | 16.869 9 | 8.383 8 | 48.720 7 | 60.269 3 |
| 13 | 2.132 93 | 0.468 84 | 18.882 1 | 8.852 7 | 54.815 6 | 69.122 0 |
| 14 | 2.260 90 | 0.442 30 | 21.015 1 | 9.295 0 | 61.007 8 | 78.416 9 |
| 15 | 2.396 56 | 0.417 27 | 23.276 0 | 9.712 2 | 67.266 8 | 88.129 2 |
| 16 | 2.540 35 | 0.393 65 | 25.672 5 | 10.105 9 | 73.565 1 | 98.235 1 |
| 17 | 2.692 77 | 0.371 36 | 28.212 9 | 10.477 3 | 79.878 3 | 108.712 3 |
| 18 | 2.854 34 | 0.350 34 | 30.905 7 | 10.827 6 | 86.184 5 | 119.539 9 |
| 19 | 3.025 60 | 0.330 51 | 33.760 0 | 11.158 1 | 92.464 3 | 130.698 1 |
| 20 | 3.207 14 | 0.311 80 | 36.785 6 | 11.469 9 | 98.700 4 | 142.168 0 |
| 21 | 3.399 56 | 0.294 16 | 39.992 7 | 11.764 1 | 104.877 6 | 153.932 1 |
| 22 | 3.603 54 | 0.277 51 | 43.392 3 | 12.041 6 | 110.982 7 | 165.973 6 |
| 23 | 3.819 75 | 0.261 80 | 46.995 8 | 12.303 4 | 117.004 1 | 178.277 0 |
| 24 | 4.048 93 | 0.246 98 | 50.815 6 | 12.550 4 | 122.931 6 | 190.827 4 |
| 25 | 4.291 87 | 0.233 00 | 54.864 5 | 12.783 4 | 128.756 5 | 203.610 7 |
| 26 | 4.549 38 | 0.219 81 | 59.156 4 | 13.003 2 | 134.471 6 | 216.613 9 |
| 27 | 4.822 35 | 0.207 37 | 63.705 8 | 13.210 5 | 140.070 5 | 229.824 4 |
| 28 | 5.111 69 | 0.195 63 | 68.528 1 | 13.406 2 | 145.548 2 | 243.230 6 |
| 29 | 5.418 39 | 0.184 56 | 73.639 8 | 13.590 7 | 150.900 3 | 256.821 3 |
| 30 | 5.743 49 | 0.174 11 | 79.058 2 | 13.764 8 | 156.123 6 | 270.586 1 |
| 31 | 6.088 10 | 0.164 25 | 84.801 7 | 13.929 1 | 161.215 5 | 284.515 2 |
| 32 | 6.453 39 | 0.154 96 | 90.889 8 | 14.084 0 | 166.174 2 | 298.599 3 |
| 33 | 6.840 59 | 0.146 19 | 97.343 2 | 14.230 2 | 170.998 3 | 312.829 5 |
| 34 | 7.251 03 | 0.137 91 | 104.183 8 | 14.368 1 | 175.687 3 | 327.197 6 |
| 35 | 7.686 09 | 0.130 11 | 111.434 8 | 14.498 2 | 180.241 0 | 341.695 9 |
| 36 | 8.147 25 | 0.122 74 | 119.120 9 | 14.621 0 | 184.659 6 | 356.316 9 |
| 37 | 8.636 09 | 0.115 79 | 127.268 1 | 14.736 8 | 188.944 0 | 371.053 7 |
| 38 | 9.154 25 | 0.109 24 | 135.904 2 | 14.846 0 | 193.095 1 | 385.899 7 |
| 39 | 9.703 51 | 0.103 06 | 145.058 5 | 14.949 1 | 197.114 2 | 400.848 8 |
| 40 | 10.285 72 | 0.097 22 | 154.762 0 | 15.046 3 | 201.003 1 | 415.895 1 |
| 41 | 10.902 86 | 0.091 72 | 165.047 7 | 15.138 0 | 204.763 6 | 431.033 1 |
| 42 | 11.557 03 | 0.086 53 | 175.950 5 | 15.224 5 | 208.397 8 | 446.257 6 |
| 43 | 12.250 45 | 0.081 63 | 187.507 6 | 15.306 2 | 211.907 8 | 461.563 8 |
| 44 | 12.985 48 | 0.077 01 | 199.758 0 | 15.383 2 | 215.296 2 | 476.947 0 |
| 45 | 13.764 61 | 0.072 65 | 212.743 5 | 15.455 8 | 218.565 5 | 492.402 8 |
| 46 | 14.590 49 | 0.068 54 | 226.508 1 | 15.524 4 | 221.718 2 | 507.927 2 |
| 47 | 15.465 92 | 0.064 66 | 241.098 6 | 15.589 0 | 224.757 2 | 523.516 2 |
| 48 | 16.393 87 | 0.061 00 | 256.564 5 | 15.650 0 | 227.685 1 | 539.166 2 |
| 49 | 17.377 50 | 0.057 55 | 272.958 4 | 15.707 6 | 230.504 8 | 554.873 8 |
| 50 | 18.420 15 | 0.054 29 | 290.335 9 | 15.761 9 | 233.219 2 | 570.635 7 |
| 60 | 32.987 69 | 0.030 31 | 533.128 2 | 16.161 4 | 255.204 2 | 730.642 9 |
| 70 | 59.075 93 | 0.016 93 | 967.932 2 | 16.384 5 | 269.711 7 | 893.590 9 |
| 80 | 105.795 99 | 0.009 45 | 1 746.599 9 | 16.509 1 | 279.058 4 | 1 058.181 2 |
| 90 | 189.464 51 | 0.005 28 | 3 141.075 2 | 16.578 7 | 284.973 3 | 1 223.688 3 |
| 100 | 339.302 08 | 0.002 95 | 5 638.368 1 | 16.617 5 | 288.664 6 | 1 389.707 6 |

## Сложные проценты

**7%**

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.070 00 | 0.934 58 | 1.000 0 | 0.934 6 | 0.934 6 | 0.934 6 |
| 2 | 1.144 90 | 0.873 44 | 2.070 0 | 1.808 0 | 2.681 5 | 2.742 6 |
| 3 | 1.225 04 | 0.816 30 | 3.214 9 | 2.624 3 | 5.130 4 | 5.366 9 |
| 4 | 1.310 80 | 0.762 90 | 4.439 9 | 3.387 2 | 8.181 9 | 8.754 1 |
| 5 | 1.402 55 | 0.712 99 | 5.750 7 | 4.100 2 | 11.746 9 | 12.854 3 |
| 6 | 1.500 73 | 0.666 34 | 7.153 3 | 4.766 5 | 15.744 9 | 17.620 9 |
| 7 | 1.605 78 | 0.622 75 | 8.654 0 | 5.389 3 | 20.104 2 | 23.010 2 |
| 8 | 1.718 19 | 0.582 01 | 10.259 8 | 5.971 3 | 24.760 2 | 28.981 4 |
| 9 | 1.838 46 | 0.543 93 | 11.978 0 | 6.515 2 | 29.655 6 | 35.496 7 |
| 10 | 1.967 15 | 0.508 35 | 13.816 4 | 7.023 6 | 34.739 1 | 42.520 3 |
| 11 | 2.104 85 | 0.475 09 | 15.783 6 | 7.498 7 | 39.965 2 | 50.018 9 |
| 12 | 2.252 19 | 0.444 01 | 17.888 5 | 7.942 7 | 45.293 3 | 57.961 6 |
| 13 | 2.409 85 | 0.414 96 | 20.140 6 | 8.357 7 | 50.687 8 | 66.319 3 |
| 14 | 2.578 53 | 0.387 82 | 22.550 5 | 8.745 5 | 56.117 3 | 75.064 7 |
| 15 | 2.759 03 | 0.362 45 | 25.129 0 | 9.107 9 | 61.554 0 | 84.172 7 |
| 16 | 2.952 16 | 0.338 73 | 27.888 1 | 9.446 6 | 66.973 7 | 93.619 3 |
| 17 | 3.158 82 | 0.316 57 | 30.840 2 | 9.763 2 | 72.355 5 | 103.382 5 |
| 18 | 3.379 93 | 0.295 86 | 33.999 0 | 10.059 1 | 77.681 0 | 113.441 6 |
| 19 | 3.616 53 | 0.276 51 | 37.379 0 | 10.335 6 | 82.934 7 | 123.777 2 |
| 20 | 3.869 68 | 0.258 42 | 40.995 5 | 10.594 0 | 88.103 1 | 134.371 2 |
| 21 | 4.140 56 | 0.241 51 | 44.865 2 | 10.835 5 | 93.174 8 | 145.206 8 |
| 22 | 4.430 40 | 0.225 71 | 49.005 7 | 11.061 2 | 98.140 5 | 156.268 0 |
| 23 | 4.740 53 | 0.210 95 | 53.436 1 | 11.272 2 | 102.992 3 | 167.540 2 |
| 24 | 5.072 37 | 0.197 15 | 58.176 7 | 11.469 3 | 107.723 8 | 179.009 5 |
| 25 | 5.427 43 | 0.184 25 | 63.249 0 | 11.653 6 | 112.330 1 | 190.663 1 |
| 26 | 5.807 35 | 0.172 20 | 68.676 5 | 11.825 8 | 116.807 1 | 202.488 9 |
| 27 | 6.213 87 | 0.160 93 | 74.483 8 | 11.986 7 | 121.152 3 | 214.475 6 |
| 28 | 6.648 84 | 0.150 40 | 80.697 7 | 12.137 1 | 125.363 5 | 226.612 7 |
| 29 | 7.114 26 | 0.140 56 | 87.346 5 | 12.277 7 | 129.439 9 | 238.890 4 |
| 30 | 7.612 26 | 0.131 37 | 94.460 8 | 12.409 0 | 133.380 9 | 251.299 4 |
| 31 | 8.145 11 | 0.122 77 | 102.073 0 | 12.531 8 | 137.186 8 | 263.831 2 |
| 32 | 8.715 27 | 0.114 74 | 110.218 2 | 12.646 6 | 140.858 5 | 276.477 8 |
| 33 | 9.325 34 | 0.107 23 | 118.933 4 | 12.753 8 | 144.397 3 | 289.231 6 |
| 34 | 9.978 11 | 0.100 22 | 128.258 8 | 12.854 0 | 147.804 7 | 302.085 6 |
| 35 | 10.676 58 | 0.093 66 | 138.236 9 | 12.947 7 | 151.082 9 | 315.033 3 |
| 36 | 11.423 94 | 0.087 54 | 148.913 5 | 13.035 2 | 154.234 2 | 328.068 5 |
| 37 | 12.223 62 | 0.081 81 | 160.337 4 | 13.117 0 | 157.261 2 | 341.185 5 |
| 38 | 13.079 27 | 0.076 46 | 172.561 0 | 13.193 5 | 160.166 5 | 354.379 0 |
| 39 | 13.994 82 | 0.071 46 | 185.640 3 | 13.264 9 | 162.953 3 | 367.643 9 |
| 40 | 14.974 46 | 0.066 78 | 199.635 1 | 13.331 7 | 165.624 5 | 380.975 6 |
| 41 | 16.022 67 | 0.062 41 | 214.609 6 | 13.394 1 | 168.183 3 | 394.369 7 |
| 42 | 17.144 26 | 0.058 33 | 230.632 2 | 13.452 4 | 170.633 1 | 407.822 2 |
| 43 | 18.344 35 | 0.054 51 | 247.776 5 | 13.507 0 | 172.977 2 | 421.329 1 |
| 44 | 19.628 46 | 0.050 95 | 266.120 9 | 13.557 9 | 175.218 8 | 434.887 0 |
| 45 | 21.002 45 | 0.047 61 | 285.749 3 | 13.605 5 | 177.361 4 | 448.492 5 |
| 46 | 22.472 62 | 0.044 50 | 306.751 8 | 13.650 0 | 179.408 4 | 462.142 6 |
| 47 | 24.045 71 | 0.041 59 | 329.224 4 | 13.691 6 | 181.363 0 | 475.834 2 |
| 48 | 25.728 91 | 0.038 87 | 353.270 1 | 13.730 5 | 183.228 6 | 489.564 7 |
| 49 | 27.529 93 | 0.036 32 | 378.999 0 | 13.766 8 | 185.008 5 | 503.331 4 |
| 50 | 29.457 03 | 0.033 95 | 406.528 9 | 13.800 7 | 186.705 9 | 517.132 2 |
| 60 | 57.946 43 | 0.017 26 | 813.520 4 | 14.039 2 | 199.806 9 | 656.583 1 |
| 70 | 113.989 39 | 0.008 77 | 1 614.134 2 | 14.160 4 | 207.678 9 | 797.708 7 |
| 80 | 224.234 39 | 0.004 46 | 3 189.062 7 | 14.222 0 | 212.296 8 | 939.685 6 |
| 90 | 441.102 98 | 0.002 27 | 6 287.185 4 | 14.253 3 | 214.957 5 | 1 082.095 3 |
| 100 | 867.716 33 | 0.001 15 | 12 381.661 8 | 14.269 3 | 216.469 3 | 1 224.725 0 |

## Сложные проценты

***8%***

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.080 00 | 0.925 93 | 1.000 0 | 0.925 9 | 0.925 9 | 0.925 9 |
| 2 | 1.166 40 | 0.857 34 | 2.080 0 | 1.783 3 | 2.640 6 | 2.709 2 |
| 3 | 1.259 71 | 0.793 83 | 3.246 4 | 2.577 1 | 5.022 1 | 5.286 3 |
| 4 | 1.360 49 | 0.735 03 | 4.506 1 | 3.312 1 | 7.962 2 | 8.598 4 |
| 5 | 1.469 33 | 0.680 58 | 5.866 6 | 3.992 7 | 11.365 1 | 12.591 1 |
| 6 | 1.586 87 | 0.630 17 | 7.335 9 | 4.622 9 | 15.146 2 | 17.214 0 |
| 7 | 1.713 82 | 0.583 49 | 8.922 8 | 5.206 4 | 19.230 6 | 22.420 4 |
| 8 | 1.850 93 | 0.540 27 | 10.636 6 | 5.746 6 | 23.552 7 | 28.167 0 |
| 9 | 1.999 00 | 0.500 25 | 12.487 6 | 6.246 9 | 28.055 0 | 34.413 9 |
| 10 | 2.158 92 | 0.463 19 | 14.486 6 | 6.710 1 | 32.686 9 | 41.124 0 |
| 11 | 2.331 64 | 0.428 88 | 16.645 5 | 7.139 0 | 37.404 6 | 48.262 9 |
| 12 | 2.518 17 | 0.397 11 | 18.977 1 | 7.536 1 | 42.170 0 | 55.799 0 |
| 13 | 2.719 62 | 0.367 70 | 21.495 3 | 7.903 8 | 46.950 1 | 63.702 8 |
| 14 | 2.937 19 | 0.340 46 | 24.214 9 | 8.244 2 | 51.716 5 | 71.947 0 |
| 15 | 3.172 17 | 0.315 24 | 27.152 1 | 8.559 5 | 56.445 1 | 80.506 5 |
| 16 | 3.425 94 | 0.291 89 | 30.324 3 | 8.851 4 | 61.115 4 | 89.357 9 |
| 17 | 3.700 02 | 0.270 27 | 33.750 2 | 9.121 6 | 65.710 0 | 98.479 5 |
| 18 | 3.996 02 | 0.250 25 | 37.450 2 | 9.371 9 | 70.214 4 | 107.851 4 |
| 19 | 4.315 70 | 0.231 71 | 41.446 3 | 9.603 6 | 74.617 0 | 117.455 0 |
| 20 | 4.660 96 | 0.214 55 | 45.762 0 | 9.818 1 | 78.907 9 | 127.273 2 |
| 21 | 5.033 83 | 0.198 66 | 50.422 9 | 10.016 8 | 83.079 7 | 137.290 0 |
| 22 | 5.436 54 | 0.183 94 | 55.456 8 | 10.200 7 | 87.126 4 | 147.490 7 |
| 23 | 5.871 46 | 0.170 32 | 60.893 3 | 10.371 1 | 91.043 7 | 157.861 8 |
| 24 | 6.341 18 | 0.157 70 | 66.764 8 | 10.528 8 | 94.828 4 | 168.390 5 |
| 25 | 6.848 48 | 0.146 02 | 73.105 9 | 10.674 8 | 98.478 9 | 179.065 3 |
| 26 | 7.396 35 | 0.135 20 | 79.954 4 | 10.810 0 | 101.994 1 | 189.875 3 |
| 27 | 7.988 06 | 0.125 19 | 87.350 8 | 10.935 2 | 105.374 2 | 200.810 4 |
| 28 | 8.627 11 | 0.115 91 | 95.338 8 | 11.051 1 | 108.619 8 | 211.861 5 |
| 29 | 9.317 27 | 0.107 33 | 103.965 9 | 11.158 4 | 111.732 3 | 223.019 9 |
| 30 | 10.062 66 | 0.099 38 | 113.283 2 | 11.257 8 | 114.713 6 | 234.277 7 |
| 31 | 10.867 67 | 0.092 02 | 123.345 9 | 11.349 8 | 117.566 1 | 245.627 5 |
| 32 | 11.737 08 | 0.085 20 | 134.213 5 | 11.435 0 | 120.292 5 | 257.062 5 |
| 33 | 12.676 05 | 0.078 89 | 145.950 6 | 11.513 9 | 122.895 8 | 268.576 4 |
| 34 | 13.690 13 | 0.073 05 | 158.626 7 | 11.586 9 | 125.379 3 | 280.163 3 |
| 35 | 14.785 34 | 0.067 63 | 172.316 8 | 11.654 6 | 127.746 6 | 291.817 9 |
| 36 | 15.968 17 | 0.062 62 | 187.102 1 | 11.717 2 | 130.001 0 | 303.535 1 |
| 37 | 17.245 63 | 0.057 99 | 203.070 3 | 11.775 2 | 132.146 5 | 315.310 3 |
| 38 | 18.625 28 | 0.053 69 | 220.315 9 | 11.828 9 | 134.186 8 | 327.139 1 |
| 39 | 20.115 30 | 0.049 71 | 238.941 2 | 11.878 6 | 136.125 6 | 339.017 7 |
| 40 | 21.724 52 | 0.046 03 | 259.056 5 | 11.924 6 | 137.966 8 | 350.942 3 |
| 41 | 23.462 48 | 0.042 62 | 280.781 0 | 11.967 2 | 139.714 3 | 362.909 6 |
| 42 | 25.339 48 | 0.039 46 | 304.243 5 | 12.006 7 | 141.371 8 | 374.916 3 |
| 43 | 27.366 64 | 0.036 54 | 329.583 0 | 12.043 2 | 142.943 0 | 386.959 5 |
| 44 | 29.555 97 | 0.033 83 | 356.949 6 | 12.077 1 | 144.431 7 | 399.036 6 |
| 45 | 31.920 45 | 0.031 33 | 386.505 6 | 12.108 4 | 145.841 5 | 411.145 0 |
| 46 | 34.474 09 | 0.029 01 | 418.426 1 | 12.137 4 | 147.175 8 | 423.282 4 |
| 47 | 37.232 01 | 0.026 86 | 452.900 2 | 12.164 3 | 148.438 2 | 435.446 7 |
| 48 | 40.210 57 | 0.024 87 | 490.132 2 | 12.189 1 | 149.631 9 | 447.635 8 |
| 49 | 43.427 42 | 0.023 03 | 530.342 7 | 12.212 2 | 150.760 2 | 459.848 0 |
| 50 | 46.901 61 | 0.021 32 | 573.770 2 | 12.233 5 | 151.826 3 | 472.081 4 |
| 60 | 101.257 06 | 0.009 88 | 1 253.213 3 | 12.376 6 | 159.676 6 | 595.293 1 |
| 70 | 218.606 41 | 0.004 57 | 2 720.080 1 | 12.442 8 | 163.975 4 | 719.464 8 |
| 80 | 471.954 83 | 0.002 12 | 5 886.935 4 | 12.473 5 | 166.273 6 | 844.081 1 |
| 90 | 1 018.915 09 | 0.000 98 | 12 723.938 6 | 12.487 7 | 167.480 3 | 968.903 3 |
| 100 | 2 199.761 26 | 0.000 45 | 27 484.515 7 | 12.494 3 | 168.105 0 | 1 093.821 0 |

## Сложные проценты

*9%*

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.090 00 | 0.917 43 | 1.000 0 | 0.917 4 | 0.917 4 | 0.917 4 |
| 2 | 1.188 10 | 0.841 68 | 2.090 0 | 1.759 1 | 2.600 8 | 2.676 5 |
| 3 | 1.295 03 | 0.772 18 | 3.278 1 | 2.531 3 | 4.917 3 | 5.207 8 |
| 4 | 1.411 58 | 0.708 43 | 4.573 1 | 3.239 7 | 7.751 0 | 8.447 6 |
| 5 | 1.538 62 | 0.649 93 | 5.984 7 | 3.889 7 | 11.000 7 | 12.337 2 |
| 6 | 1.677 10 | 0.596 27 | 7.523 3 | 4.485 9 | 14.578 3 | 16.823 1 |
| 7 | 1.828 04 | 0.547 03 | 9.200 4 | 5.033 0 | 18.407 5 | 21.856 1 |
| 8 | 1.992 56 | 0.501 87 | 11.028 5 | 5.534 8 | 22.422 5 | 27.390 9 |
| 9 | 2.171 89 | 0.460 43 | 13.021 0 | 5.995 2 | 26.566 3 | 33.386 1 |
| 10 | 2.367 36 | 0.422 41 | 15.192 9 | 6.417 7 | 30.790 4 | 39.803 8 |
| 11 | 2.580 43 | 0.387 53 | 17.560 3 | 6.805 2 | 35.053 3 | 46.609 0 |
| 12 | 2.812 66 | 0.355 53 | 20.140 7 | 7.160 7 | 39.319 7 | 53.769 7 |
| 13 | 3.065 80 | 0.326 18 | 22.953 4 | 7.486 9 | 43.560 0 | 61.256 6 |
| 14 | 3.341 73 | 0.299 25 | 26.019 2 | 7.786 2 | 47.749 5 | 69.042 8 |
| 15 | 3.642 48 | 0.274 54 | 29.360 9 | 8.060 7 | 51.867 6 | 77.103 5 |
| 16 | 3.970 31 | 0.251 87 | 33.003 4 | 8.312 6 | 55.897 5 | 85.416 0 |
| 17 | 4.327 63 | 0.231 07 | 36.973 7 | 8.543 6 | 59.825 7 | 93.959 7 |
| 18 | 4.717 12 | 0.211 99 | 41.301 3 | 8.755 6 | 63.641 6 | 102.715 3 |
| 19 | 5.141 66 | 0.194 49 | 46.018 5 | 8.950 1 | 67.336 9 | 111.665 4 |
| 20 | 5.604 41 | 0.178 43 | 51.160 1 | 9.128 5 | 70.905 5 | 120.793 9 |
| 21 | 6.108 81 | 0.163 70 | 56.764 5 | 9.292 2 | 74.343 2 | 130.086 2 |
| 22 | 6.658 60 | 0.150 18 | 62.873 3 | 9.442 4 | 77.647 2 | 139.528 6 |
| 23 | 7.257 87 | 0.137 78 | 69.531 9 | 9.580 2 | 80.816 2 | 149.108 8 |
| 24 | 7.911 08 | 0.126 40 | 76.789 8 | 9.706 6 | 83.849 9 | 158.815 4 |
| 25 | 8.623 08 | 0.115 97 | 84.700 9 | 9.822 6 | 86.749 1 | 168.638 0 |
| 26 | 9.399 16 | 0.106 39 | 93.324 0 | 9.929 0 | 89.515 3 | 178.567 0 |
| 27 | 10.245 08 | 0.097 61 | 102.723 1 | 10.026 6 | 92.150 7 | 188.593 6 |
| 28 | 11.167 14 | 0.089 55 | 112.968 2 | 10.116 1 | 94.658 0 | 198.709 7 |
| 29 | 12.172 18 | 0.082 15 | 124.135 4 | 10.198 3 | 97.040 5 | 208.908 0 |
| 30 | 13.267 68 | 0.075 37 | 136.307 5 | 10.273 7 | 99.301 7 | 219.181 6 |
| 31 | 14.461 77 | 0.069 15 | 149.575 2 | 10.342 8 | 101.445 2 | 229.524 4 |
| 32 | 15.763 33 | 0.063 44 | 164.037 0 | 10.406 2 | 103.475 3 | 239.930 7 |
| 33 | 17.182 03 | 0.058 20 | 179.800 3 | 10.464 4 | 105.395 9 | 250.395 1 |
| 34 | 18.728 41 | 0.053 39 | 196.982 3 | 10.517 8 | 107.211 3 | 260.912 9 |
| 35 | 20.413 97 | 0.048 99 | 215.710 8 | 10.566 8 | 108.925 8 | 271.479 8 |
| 36 | 22.251 23 | 0.044 94 | 236.124 7 | 10.611 8 | 110.543 7 | 282.091 5 |
| 37 | 24.253 84 | 0.041 23 | 258.375 9 | 10.653 0 | 112.069 2 | 292.744 5 |
| 38 | 26.436 68 | 0.037 83 | 282.629 8 | 10.690 8 | 113.506 6 | 303.435 3 |
| 39 | 28.815 98 | 0.034 70 | 309.066 5 | 10.725 5 | 114.860 0 | 314.160 9 |
| 40 | 31.409 42 | 0.031 84 | 337.882 4 | 10.757 4 | 116.133 5 | 324.918 2 |
| 41 | 34.236 27 | 0.029 21 | 369.291 9 | 10.786 6 | 117.331 1 | 335.704 8 |
| 42 | 37.317 53 | 0.026 80 | 403.528 1 | 10.813 4 | 118.456 6 | 346.518 2 |
| 43 | 40.676 11 | 0.024 58 | 440.845 7 | 10.838 0 | 119.513 7 | 357.356 1 |
| 44 | 44.336 96 | 0.022 55 | 481.521 8 | 10.860 5 | 120.506 1 | 368.216 6 |
| 45 | 48.327 29 | 0.020 69 | 525.858 7 | 10.881 2 | 121.437 3 | 379.097 8 |
| 46 | 52.676 74 | 0.018 98 | 574.186 0 | 10.900 2 | 122.310 5 | 389.998 0 |
| 47 | 57.417 65 | 0.017 42 | 626.862 8 | 10.917 6 | 123.129 1 | 400.915 6 |
| 48 | 62.585 24 | 0.015 98 | 684.280 4 | 10.933 6 | 123.896 0 | 411.849 2 |
| 49 | 68.217 91 | 0.014 66 | 746.865 6 | 10.948 2 | 124.614 3 | 422.797 4 |
| 50 | 74.357 52 | 0.013 45 | 815.083 6 | 10.961 7 | 125.286 7 | 433.759 1 |
| 60 | 176.031 29 | 0.005 68 | 1 944.792 1 | 11.048 0 | 130.016 2 | 543.911 2 |
| 70 | 416.730 09 | 0.002 40 | 4 619.223 2 | 11.084 4 | 132.378 6 | 654.617 2 |
| 80 | 986.551 67 | 0.001 01 | 10 950.574 1 | 11.099 8 | 133.530 5 | 765.557 2 |
| 90 | 2 335.526 58 | 0.000 43 | 25 939.184 2 | 11.106 4 | 134.082 1 | 876.596 1 |
| 100 | 5 529.040 79 | 0.000 18 | 61 422.675 5 | 11.109 1 | 134.342 6 | 987.676 6 |

## Сложные проценты

*10%*

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.100 00 | 0.909 09 | 1.000 0 | 0.909 1 | 0.909 1 | 0.909 1 |
| 2 | 1.210 00 | 0.826 45 | 2.100 0 | 1.735 5 | 2.562 0 | 2.644 6 |
| 3 | 1.331 00 | 0.751 31 | 3.310 0 | 2.486 9 | 4.815 9 | 5.131 5 |
| 4 | 1.464 10 | 0.683 01 | 4.641 0 | 3.169 9 | 7.548 0 | 8.301 3 |
| 5 | 1.610 51 | 0.620 92 | 6.105 1 | 3.790 8 | 10.652 6 | 12.092 1 |
| 6 | 1.771 56 | 0.564 47 | 7.715 6 | 4.355 3 | 14.039 4 | 16.447 4 |
| 7 | 1.948 72 | 0.513 16 | 9.487 2 | 4.868 4 | 17.631 5 | 21.315 8 |
| 8 | 2.143 59 | 0.466 51 | 11.435 9 | 5.334 9 | 21.363 6 | 26.650 7 |
| 9 | 2.357 95 | 0.424 10 | 13.579 5 | 5.759 0 | 25.180 5 | 32.409 8 |
| 10 | 2.593 74 | 0.385 54 | 15.937 4 | 6.144 6 | 29.035 9 | 38.554 3 |
| 11 | 2.853 12 | 0.350 49 | 18.531 2 | 6.495 1 | 32.891 3 | 45.049 4 |
| 12 | 3.138 43 | 0.318 63 | 21.384 3 | 6.813 7 | 36.714 9 | 51.863 1 |
| 13 | 3.452 27 | 0.289 66 | 24.522 7 | 7.103 4 | 40.480 5 | 58.966 4 |
| 14 | 3.797 50 | 0.263 33 | 27.975 0 | 7.366 7 | 44.167 2 | 66.333 1 |
| 15 | 4.177 25 | 0.239 39 | 31.772 5 | 7.606 1 | 47.758 1 | 73.939 2 |
| 16 | 4.594 97 | 0.217 63 | 35.949 7 | 7.823 7 | 51.240 1 | 81.762 9 |
| 17 | 5.054 47 | 0.197 84 | 40.544 7 | 8.021 6 | 54.603 5 | 89.784 5 |
| 18 | 5.559 92 | 0.179 86 | 45.599 2 | 8.201 4 | 57.841 0 | 97.985 9 |
| 19 | 6.115 91 | 0.163 51 | 51.159 1 | 8.364 9 | 60.947 6 | 106.350 8 |
| 20 | 6.727 50 | 0.148 64 | 57.275 0 | 8.513 6 | 63.920 5 | 114.864 4 |
| 21 | 7.400 25 | 0.135 13 | 64.002 5 | 8.648 7 | 66.758 2 | 123.513 1 |
| 22 | 8.140 27 | 0.122 85 | 71.402 7 | 8.771 5 | 69.460 8 | 132.284 6 |
| 23 | 8.954 30 | 0.111 68 | 79.543 0 | 8.883 2 | 72.029 4 | 141.167 8 |
| 24 | 9.849 73 | 0.101 53 | 88.497 3 | 8.984 7 | 74.466 0 | 150.152 6 |
| 25 | 10.834 71 | 0.092 30 | 98.347 1 | 9.077 0 | 76.773 4 | 159.229 6 |
| 26 | 11.918 18 | 0.083 91 | 109.181 8 | 9.160 9 | 78.955 0 | 168.390 5 |
| 27 | 13.109 99 | 0.076 28 | 121.099 9 | 9.237 2 | 81.014 5 | 177.627 8 |
| 28 | 14.420 99 | 0.069 34 | 134.209 9 | 9.306 6 | 82.956 1 | 186.934 3 |
| 29 | 15.863 09 | 0.063 04 | 148.630 9 | 9.369 6 | 84.784 2 | 196.303 9 |
| 30 | 17.449 40 | 0.057 31 | 164.494 0 | 9.426 9 | 86.503 5 | 205.730 9 |
| 31 | 19.194 34 | 0.052 10 | 181.943 4 | 9.479 0 | 88.118 6 | 215.209 9 |
| 32 | 21.113 78 | 0.047 36 | 201.137 8 | 9.526 4 | 89.634 2 | 224.736 2 |
| 33 | 23.225 15 | 0.043 06 | 222.251 5 | 9.569 4 | 91.055 0 | 234.305 7 |
| 34 | 25.547 67 | 0.039 14 | 245.476 7 | 9.608 6 | 92.385 9 | 243.914 3 |
| 35 | 28.102 44 | 0.035 58 | 271.024 4 | 9.644 2 | 93.631 3 | 253.558 4 |
| 36 | 30.912 68 | 0.032 35 | 299.126 8 | 9.676 5 | 94.795 9 | 263.234 9 |
| 37 | 34.003 95 | 0.029 41 | 330.039 5 | 9.705 9 | 95.884 0 | 272.940 8 |
| 38 | 37.404 34 | 0.026 73 | 364.043 4 | 9.732 7 | 96.899 9 | 282.673 5 |
| 39 | 41.144 78 | 0.024 30 | 401.447 8 | 9.757 0 | 97.847 8 | 292.430 4 |
| 40 | 45.259 26 | 0.022 09 | 442.592 6 | 9.779 1 | 98.731 6 | 302.209 5 |
| 41 | 49.785 18 | 0.020 09 | 487.851 8 | 9.799 1 | 99.555 1 | 312.008 6 |
| 42 | 54.763 70 | 0.018 26 | 537.637 0 | 9.817 4 | 100.322 1 | 321.826 0 |
| 43 | 60.240 07 | 0.016 60 | 592.400 7 | 9.834 0 | 101.035 9 | 331.660 0 |
| 44 | 66.264 08 | 0.015 09 | 652.640 8 | 9.849 1 | 101.699 9 | 341.509 1 |
| 45 | 72.890 48 | 0.013 72 | 718.904 8 | 9.862 8 | 102.317 2 | 351.371 9 |
| 46 | 80.179 53 | 0.012 47 | 791.795 3 | 9.875 3 | 102.891 0 | 361.247 2 |
| 47 | 88.197 49 | 0.011 34 | 871.974 9 | 9.886 6 | 103.423 8 | 371.133 8 |
| 48 | 97.017 23 | 0.010 31 | 960.172 3 | 9.896 9 | 103.918 6 | 381.030 7 |
| 49 | 106.718 96 | 0.009 37 | 1 057.189 6 | 9.906 3 | 104.377 8 | 390.937 0 |
| 50 | 117.390 85 | 0.008 52 | 1 163.908 5 | 9.914 8 | 104.803 7 | 400.851 9 |
| 60 | 304.481 64 | 0.003 28 | 3 034.816 4 | 9.967 2 | 107.668 2 | 500.328 4 |
| 70 | 789.746 96 | 0.001 27 | 7 887.469 6 | 9.987 3 | 108.974 4 | 600.126 6 |
| 80 | 2 048.400 21 | 0.000 49 | 20 474.002 1 | 9.995 1 | 109.555 8 | 700.048 8 |
| 90 | 5 313.022 61 | 0.000 19 | 53 120.226 1 | 9.998 1 | 109.809 9 | 800.018 8 |
| 100 | 13 780.612 34 | 0.000 07 | 137 796.123 4 | 9.999 3 | 109.919 5 | 900.007 3 |

## Сложные проценты

***12%***

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.120 00 | 0.892 86 | 1.000 0 | 0.892 9 | 0.892 9 | 0.892 9 |
| 2 | 1.254 40 | 0.797 19 | 2.120 0 | 1.690 1 | 2.487 2 | 2.582 9 |
| 3 | 1.404 93 | 0.711 78 | 3.374 4 | 2.401 8 | 4.622 6 | 4.984 7 |
| 4 | 1.573 52 | 0.635 52 | 4.779 3 | 3.037 3 | 7.164 7 | 8.022 1 |
| 5 | 1.762 34 | 0.567 43 | 6.352 8 | 3.604 8 | 10.001 8 | 11.626 9 |
| 6 | 1.973 82 | 0.506 63 | 8.115 2 | 4.111 4 | 13.041 6 | 15.738 3 |
| 7 | 2.210 68 | 0.452 35 | 10.089 0 | 4.563 8 | 16.208 0 | 20.302 0 |
| 8 | 2.475 96 | 0.403 88 | 12.299 7 | 4.967 6 | 19.439 1 | 25.269 7 |
| 9 | 2.773 08 | 0.360 61 | 14.775 7 | 5.328 2 | 22.684 6 | 30.597 9 |
| 10 | 3.105 85 | 0.321 97 | 17.548 7 | 5.650 2 | 25.904 3 | 36.248 1 |
| 11 | 3.478 55 | 0.287 48 | 20.654 6 | 5.937 7 | 29.066 5 | 42.185 8 |
| 12 | 3.895 98 | 0.256 68 | 24.133 1 | 6.194 4 | 32.146 7 | 48.380 2 |
| 13 | 4.363 49 | 0.229 17 | 28.029 1 | 6.423 5 | 35.125 9 | 54.803 8 |
| 14 | 4.887 11 | 0.204 62 | 32.392 6 | 6.628 2 | 37.990 6 | 61.431 9 |
| 15 | 5.473 57 | 0.182 70 | 37.279 7 | 6.810 9 | 40.731 0 | 68.242 8 |
| 16 | 6.130 39 | 0.163 12 | 42.753 3 | 6.974 0 | 43.341 0 | 75.216 8 |
| 17 | 6.866 04 | 0.145 64 | 48.883 7 | 7.119 6 | 45.816 9 | 82.336 4 |
| 18 | 7.689 97 | 0.130 04 | 55.749 7 | 7.249 7 | 48.157 6 | 89.586 1 |
| 19 | 8.612 76 | 0.116 11 | 63.439 7 | 7.365 8 | 50.363 7 | 96.951 9 |
| 20 | 9.646 29 | 0.103 67 | 72.052 4 | 7.469 4 | 52.437 0 | 104.421 3 |
| 21 | 10.803 85 | 0.092 56 | 81.698 7 | 7.562 0 | 54.380 8 | 111.983 3 |
| 22 | 12.100 31 | 0.082 64 | 92.502 6 | 7.644 6 | 56.198 9 | 119.628 0 |
| 23 | 13.552 35 | 0.073 79 | 104.602 9 | 7.718 4 | 57.896 0 | 127.346 4 |
| 24 | 15.178 63 | 0.065 88 | 118.155 2 | 7.784 3 | 59.477 2 | 135.130 7 |
| 25 | 17.000 06 | 0.058 82 | 133.333 9 | 7.843 1 | 60.947 8 | 142.973 8 |
| 26 | 19.040 07 | 0.052 52 | 150.333 9 | 7.895 7 | 62.313 3 | 150.869 5 |
| 27 | 21.324 88 | 0.046 89 | 169.374 0 | 7.942 6 | 63.579 4 | 158.812 1 |
| 28 | 23.883 87 | 0.041 87 | 190.698 9 | 7.984 4 | 64.751 8 | 166.796 5 |
| 29 | 26.749 93 | 0.037 38 | 214.582 8 | 8.021 8 | 65.835 9 | 174.818 3 |
| 30 | 29.959 92 | 0.033 38 | 241.332 7 | 8.055 2 | 66.837 2 | 182.873 5 |
| 31 | 33.555 11 | 0.029 80 | 271.292 6 | 8.085 0 | 67.761 1 | 190.958 5 |
| 32 | 37.581 73 | 0.026 61 | 304.847 7 | 8.111 6 | 68.612 6 | 199.070 0 |
| 33 | 42.091 53 | 0.023 76 | 342.429 4 | 8.135 4 | 69.396 6 | 207.205 4 |
| 34 | 47.142 52 | 0.021 21 | 384.521 0 | 8.156 6 | 70.117 8 | 215.362 0 |
| 35 | 52.799 62 | 0.018 94 | 431.663 5 | 8.175 5 | 70.780 7 | 223.537 5 |
| 36 | 59.135 57 | 0.016 91 | 484.463 1 | 8.192 4 | 71.389 4 | 231.729 9 |
| 37 | 66.231 84 | 0.015 10 | 543.598 7 | 8.207 5 | 71.948 1 | 239.937 4 |
| 38 | 74.179 66 | 0.013 48 | 609.830 5 | 8.221 0 | 72.460 4 | 248.158 4 |
| 39 | 83.081 22 | 0.012 04 | 684.010 2 | 8.233 0 | 72.929 8 | 256.391 4 |
| 40 | 93.050 97 | 0.010 75 | 767.091 4 | 8.243 8 | 73.359 6 | 264.635 2 |
| 41 | 104.217 09 | 0.009 60 | 860.142 4 | 8.253 4 | 73.753 1 | 272.888 6 |
| 42 | 116.723 14 | 0.008 57 | 964.359 5 | 8.261 9 | 74.112 9 | 281.150 5 |
| 43 | 130.729 91 | 0.007 65 | 1 081.082 6 | 8.269 6 | 74.441 8 | 289.420 1 |
| 44 | 146.417 50 | 0.006 83 | 1 211.812 5 | 8.276 4 | 74.742 3 | 297.696 5 |
| 45 | 163.987 60 | 0.006 10 | 1 358.230 0 | 8.282 5 | 75.016 7 | 305.979 0 |
| 46 | 183.666 12 | 0.005 44 | 1 522.217 6 | 8.288 0 | 75.267 2 | 314.267 0 |
| 47 | 205.706 05 | 0.004 86 | 1 705.883 8 | 8.292 8 | 75.495 7 | 322.559 8 |
| 48 | 230.390 78 | 0.004 34 | 1 911.589 8 | 8.297 2 | 75.704 0 | 330.857 0 |
| 49 | 258.037 67 | 0.003 88 | 2 141.980 6 | 8.301 0 | 75.893 9 | 339.158 0 |
| 50 | 289.002 19 | 0.003 46 | 2 400.018 2 | 8.304 5 | 76.066 9 | 347.462 5 |
| 60 | 897.596 93 | 0.001 11 | 7 471.641 1 | 8.324 0 | 77.134 1 | 430.632 9 |
| 70 | 2 787.799 83 | 0.000 36 | 23 223.331 9 | 8.330 3 | 77.540 6 | 513.913 8 |
| 80 | 8 658.483 10 | 0.000 12 | 72 145.692 5 | 8.332 4 | 77.691 8 | 597.230 2 |
| 90 | 26 891.934 22 | 0.000 04 | 224 091.118 5 | 8.333 0 | 77.747 0 | 680.558 1 |
| 100 | 83 522.265 73 | 0.000 01 | 696 010.547 7 | 8.333 2 | 77.766 9 | 763.889 7 |

## Сложные проценты

***15%***

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.150 00 | 0.869 57 | 1.000 0 | 0.869 6 | 0.869 6 | 0.869 6 |
| 2 | 1.322 50 | 0.756 14 | 2.150 0 | 1.625 7 | 2.381 9 | 2.495 3 |
| 3 | 1.520 88 | 0.657 52 | 3.472 5 | 2.283 2 | 4.354 4 | 4.778 5 |
| 4 | 1.749 01 | 0.571 75 | 4.993 4 | 2.855 0 | 6.641 4 | 7.633 5 |
| 5 | 2.011 36 | 0.497 18 | 6.742 4 | 3.352 2 | 9.127 3 | 10.985 6 |
| 6 | 2.313 06 | 0.432 33 | 8.753 7 | 3.784 5 | 11.721 3 | 14.770 1 |
| 7 | 2.660 02 | 0.375 94 | 11.066 8 | 4.160 4 | 14.352 8 | 18.930 5 |
| 8 | 3.059 02 | 0.326 90 | 13.726 8 | 4.487 3 | 16.968 0 | 23.417 9 |
| 9 | 3.517 88 | 0.284 26 | 16.785 8 | 4.771 6 | 19.526 4 | 28.189 4 |
| 10 | 4.045 56 | 0.247 18 | 20.303 7 | 5.018 8 | 21.998 2 | 33.208 2 |
| 11 | 4.652 39 | 0.214 94 | 24.349 3 | 5.233 7 | 24.362 6 | 38.441 9 |
| 12 | 5.350 25 | 0.186 91 | 29.001 7 | 5.420 6 | 26.605 5 | 43.862 5 |
| 13 | 6.152 79 | 0.162 53 | 34.351 9 | 5.583 1 | 28.718 4 | 49.445 7 |
| 14 | 7.075 71 | 0.141 33 | 40.504 7 | 5.724 5 | 30.697 0 | 55.170 2 |
| 15 | 8.137 06 | 0.122 89 | 47.580 4 | 5.847 4 | 32.540 4 | 61.017 5 |
| 16 | 9.357 62 | 0.106 86 | 55.717 5 | 5.954 2 | 34.250 2 | 66.971 8 |
| 17 | 10.761 26 | 0.092 93 | 65.075 1 | 6.047 2 | 35.830 0 | 73.018 9 |
| 18 | 12.375 45 | 0.080 81 | 75.836 4 | 6.128 0 | 37.284 5 | 79.146 9 |
| 19 | 14.231 77 | 0.070 27 | 88.211 8 | 6.198 2 | 38.619 5 | 85.345 1 |
| 20 | 16.366 54 | 0.061 10 | 102.443 6 | 6.259 3 | 39.841 5 | 91.604 5 |
| 21 | 18.821 52 | 0.053 13 | 118.810 1 | 6.312 5 | 40.957 2 | 97.916 9 |
| 22 | 21.644 75 | 0.046 20 | 137.631 6 | 6.358 7 | 41.973 7 | 104.275 6 |
| 23 | 24.891 46 | 0.040 17 | 159.276 4 | 6.398 8 | 42.897 7 | 110.674 4 |
| 24 | 28.625 18 | 0.034 93 | 184.167 8 | 6.433 8 | 43.736 1 | 117.108 2 |
| 25 | 32.918 95 | 0.030 38 | 212.793 0 | 6.464 1 | 44.495 5 | 123.572 3 |
| 26 | 37.856 80 | 0.026 42 | 245.712 0 | 6.490 6 | 45.182 3 | 130.062 9 |
| 27 | 43.535 31 | 0.022 97 | 283.568 8 | 6.513 5 | 45.802 5 | 136.576 4 |
| 28 | 50.065 61 | 0.019 97 | 327.104 1 | 6.533 5 | 46.361 8 | 143.109 9 |
| 29 | 57.575 45 | 0.017 37 | 377.169 7 | 6.550 9 | 46.865 5 | 149.660 8 |
| 30 | 66.211 77 | 0.015 10 | 434.745 1 | 6.566 0 | 47.318 6 | 156.226 8 |
| 31 | 76.143 54 | 0.013 13 | 500.956 9 | 6.579 1 | 47.725 7 | 162.805 9 |
| 32 | 87.565 07 | 0.011 42 | 577.100 5 | 6.590 5 | 48.091 1 | 169.396 4 |
| 33 | 100.699 83 | 0.009 93 | 664.665 5 | 6.600 5 | 48.418 8 | 175.996 9 |
| 34 | 115.804 80 | 0.008 64 | 765.365 4 | 6.609 1 | 48.712 4 | 182.606 0 |
| 35 | 133.175 52 | 0.007 51 | 881.170 2 | 6.616 6 | 48.975 2 | 189.222 6 |
| 36 | 153.151 85 | 0.006 53 | 1 014.345 7 | 6.623 1 | 49.210 3 | 195.845 8 |
| 37 | 176.124 63 | 0.005 68 | 1 167.497 5 | 6.628 8 | 49.420 4 | 202.474 6 |
| 38 | 202.543 32 | 0.004 94 | 1 343.622 2 | 6.633 8 | 49.608 0 | 209.108 3 |
| 39 | 232.924 82 | 0.004 29 | 1 546.165 5 | 6.638 0 | 49.775 4 | 215.746 4 |
| 40 | 267.863 55 | 0.003 73 | 1 779.090 3 | 6.641 8 | 49.924 8 | 222.388 1 |
| 41 | 308.043 08 | 0.003 25 | 2 046.953 9 | 6.645 0 | 50.057 9 | 229.033 2 |
| 42 | 354.249 54 | 0.002 82 | 2 354.996 9 | 6.647 8 | 50.176 4 | 235.681 0 |
| 43 | 407.386 97 | 0.002 45 | 2 709.246 5 | 6.650 3 | 50.282 0 | 242.331 3 |
| 44 | 468.495 02 | 0.002 13 | 3 116.633 4 | 6.652 4 | 50.375 9 | 248.983 8 |
| 45 | 538.769 27 | 0.001 86 | 3 585.128 5 | 6.654 3 | 50.459 4 | 255.638 0 |
| 46 | 619.584 66 | 0.001 61 | 4 123.897 7 | 6.655 9 | 50.533 7 | 262.294 0 |
| 47 | 712.522 36 | 0.001 40 | 4 743.482 4 | 6.657 3 | 50.599 6 | 268.951 3 |
| 48 | 819.400 71 | 0.001 22 | 5 456.004 7 | 6.658 5 | 50.658 2 | 275.609 8 |
| 49 | 942.310 82 | 0.001 06 | 6 275.405 5 | 6.659 6 | 50.710 2 | 282.269 4 |
| 50 | 1 083.657 44 | 0.000 92 | 7 217.716 3 | 6.660 5 | 50.756 3 | 288.929 9 |

## Сложные проценты

***20%***

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.200 00 | 0.833 33 | 1.000 0 | 0.833 3 | 0.833 3 | 0.833 3 |
| 2 | 1.440 00 | 0.694 44 | 2.200 0 | 1.527 8 | 2.222 2 | 2.361 1 |
| 3 | 1.728 00 | 0.578 70 | 3.640 0 | 2.106 5 | 3.958 3 | 4.467 6 |
| 4 | 2.073 60 | 0.482 25 | 5.368 0 | 2.588 7 | 5.887 3 | 7.056 3 |
| 5 | 2.488 32 | 0.401 88 | 7.441 6 | 2.990 6 | 7.896 7 | 10.046 9 |
| 6 | 2.985 98 | 0.334 90 | 9.929 9 | 3.325 5 | 9.906 1 | 13.372 4 |
| 7 | 3.583 18 | 0.279 08 | 12.915 9 | 3.604 6 | 11.859 7 | 16.977 0 |
| 8 | 4.299 82 | 0.232 57 | 16.499 1 | 3.837 2 | 13.720 2 | 20.814 2 |
| 9 | 5.159 78 | 0.193 81 | 20.798 9 | 4.031 0 | 15.464 5 | 24.845 2 |
| 10 | 6.191 74 | 0.161 51 | 25.958 7 | 4.192 5 | 17.079 6 | 29.037 6 |
| 11 | 7.430 08 | 0.134 59 | 32.150 4 | 4.327 1 | 18.560 0 | 33.364 7 |
| 12 | 8.916 10 | 0.112 16 | 39.580 5 | 4.439 2 | 19.905 9 | 37.803 9 |
| 13 | 10.699 32 | 0.093 46 | 48.496 6 | 4.532 7 | 21.120 9 | 42.336 6 |
| 14 | 12.839 18 | 0.077 89 | 59.195 9 | 4.610 6 | 22.211 3 | 46.947 2 |
| 15 | 15.407 02 | 0.064 91 | 72.035 1 | 4.675 5 | 23.184 9 | 51.622 6 |
| 16 | 18.488 43 | 0.054 09 | 87.442 1 | 4.729 6 | 24.050 3 | 56.352 2 |
| 17 | 22.186 11 | 0.045 07 | 105.930 6 | 4.774 6 | 24.816 6 | 61.126 8 |
| 18 | 26.623 33 | 0.037 56 | 128.116 7 | 4.812 2 | 25.492 7 | 65.939 0 |
| 19 | 31.948 00 | 0.031 30 | 154.740 0 | 4.843 5 | 26.087 4 | 70.782 5 |
| 20 | 38.337 60 | 0.026 08 | 186.688 0 | 4.869 6 | 26.609 1 | 75.652 1 |
| 21 | 46.005 12 | 0.021 74 | 225.025 6 | 4.891 3 | 27.065 5 | 80.543 4 |
| 22 | 55.206 14 | 0.018 11 | 271.030 7 | 4.909 4 | 27.464 1 | 85.452 8 |
| 23 | 66.247 37 | 0.015 09 | 326.236 9 | 4.924 5 | 27.811 2 | 90.377 4 |
| 24 | 79.496 85 | 0.012 58 | 392.484 2 | 4.937 1 | 28.113 1 | 95.314 5 |
| 25 | 95.396 22 | 0.010 48 | 471.981 1 | 4.947 6 | 28.375 2 | 100.262 1 |
| 26 | 114.475 46 | 0.008 74 | 567.377 3 | 4.956 3 | 28.602 3 | 105.218 4 |
| 27 | 137.370 55 | 0.007 28 | 681.852 8 | 4.963 6 | 28.798 9 | 110.182 0 |
| 28 | 164.844 66 | 0.006 07 | 819.223 3 | 4.969 7 | 28.968 7 | 115.151 7 |
| 29 | 197.813 59 | 0.005 06 | 984.068 0 | 4.974 7 | 29.115 3 | 120.126 4 |
| 30 | 237.376 31 | 0.004 21 | 1 181.881 6 | 4.978 9 | 29.241 7 | 125.105 3 |
| 31 | 284.851 58 | 0.003 51 | 1 419.257 9 | 4.982 4 | 29.350 5 | 130.087 8 |
| 32 | 341.821 89 | 0.002 93 | 1 704.109 5 | 4.985 4 | 29.444 2 | 135.073 1 |
| 33 | 410.186 27 | 0.002 44 | 2 045.931 4 | 4.987 8 | 29.524 6 | 140.060 9 |
| 34 | 492.223 52 | 0.002 03 | 2 456.117 6 | 4.989 8 | 29.593 7 | 145.050 8 |
| 35 | 590.668 23 | 0.001 69 | 2 948.341 1 | 4.991 5 | 29.652 9 | 150.042 3 |
| 36 | 708.801 87 | 0.001 41 | 3 539.009 4 | 4.992 9 | 29.703 7 | 155.035 3 |
| 37 | 850.562 25 | 0.001 18 | 4 247.811 2 | 4.994 1 | 29.747 2 | 160.029 4 |
| 38 | 1 020.674 70 | 0.000 98 | 5 098.373 5 | 4.995 1 | 29.784 5 | 165.024 5 |
| 39 | 1 224.809 64 | 0.000 82 | 6 119.048 2 | 4.995 9 | 29.816 3 | 170.020 4 |
| 40 | 1 469.771 57 | 0.000 68 | 7 343.857 8 | 4.996 6 | 29.843 5 | 175.017 0 |
| 41 | 1 763.725 88 | 0.000 57 | 8 813.629 4 | 4.997 2 | 29.866 8 | 180.014 2 |
| 42 | 2 116.471 06 | 0.000 47 | 10 577.355 3 | 4.997 6 | 29.886 6 | 185.011 8 |
| 43 | 2 539.765 27 | 0.000 39 | 12 693.826 3 | 4.998 0 | 29.903 5 | 190.009 8 |
| 44 | 3 047.718 32 | 0.000 33 | 15 233.591 6 | 4.998 4 | 29.918 0 | 195.008 2 |
| 45 | 3 657.261 99 | 0.000 27 | 18 281.309 9 | 4.998 6 | 29.930 3 | 200.006 8 |
| 46 | 4 388.714 39 | 0.000 23 | 21 938.571 9 | 4.998 9 | 29.940 8 | 205.005 7 |
| 47 | 5 266.457 26 | 0.000 19 | 26 327.286 3 | 4.999 1 | 29.949 7 | 210.004 7 |
| 48 | 6 319.748 72 | 0.000 16 | 31 593.743 6 | 4.999 2 | 29.957 3 | 215.004 0 |
| 49 | 7 583.698 46 | 0.000 13 | 37 913.492 3 | 4.999 3 | 29.963 7 | 220.003 3 |
| 50 | 9 100.438 15 | 0.000 11 | 45 497.190 8 | 4.999 5 | 29.969 2 | 225.002 7 |

## Сложные проценты

***25%***

| $n$ | $(1+i)^n$ | $v^n$ | $s_{\overline{n}\|}$ | $a_{\overline{n}\|}$ | $(Ia)_{\overline{n}\|}$ | $(Da)_{\overline{n}\|}$ |
|---|---|---|---|---|---|---|
| 1 | 1.250 00 | 0.800 00 | 1.000 0 | 0.800 0 | 0.800 0 | 0.800 0 |
| 2 | 1.562 50 | 0.640 00 | 2.250 0 | 1.440 0 | 2.080 0 | 2.240 0 |
| 3 | 1.953 13 | 0.512 00 | 3.812 5 | 1.952 0 | 3.616 0 | 4.192 0 |
| 4 | 2.441 41 | 0.409 60 | 5.765 6 | 2.361 6 | 5.254 4 | 6.553 6 |
| 5 | 3.051 76 | 0.327 68 | 8.207 0 | 2.689 3 | 6.892 8 | 9.242 9 |
| 6 | 3.814 70 | 0.262 14 | 11.258 8 | 2.951 4 | 8.465 7 | 12.194 3 |
| 7 | 4.768 37 | 0.209 72 | 15.073 5 | 3.161 1 | 9.933 7 | 15.355 4 |
| 8 | 5.960 46 | 0.167 77 | 19.841 9 | 3.328 9 | 11.275 8 | 18.684 4 |
| 9 | 7.450 58 | 0.134 22 | 25.802 3 | 3.463 1 | 12.483 8 | 22.147 5 |
| 10 | 9.313 23 | 0.107 37 | 33.252 9 | 3.570 5 | 13.557 5 | 25.718 0 |
| 11 | 11.641 53 | 0.085 90 | 42.566 1 | 3.656 4 | 14.502 4 | 29.374 4 |
| 12 | 14.551 92 | 0.068 72 | 54.207 7 | 3.725 1 | 15.327 1 | 33.099 5 |
| 13 | 18.189 89 | 0.054 98 | 68.759 6 | 3.780 1 | 16.041 8 | 36.879 6 |
| 14 | 22.737 37 | 0.043 98 | 86.949 5 | 3.824 1 | 16.657 5 | 40.703 7 |
| 15 | 28.421 71 | 0.035 18 | 109.686 8 | 3.859 3 | 17.185 3 | 44.562 9 |
| 16 | 35.527 14 | 0.028 15 | 138.108 5 | 3.887 4 | 17.635 6 | 48.450 4 |
| 17 | 44.408 92 | 0.022 52 | 173.635 7 | 3.909 9 | 18.018 4 | 52.360 3 |
| 18 | 55.511 15 | 0.018 01 | 218.044 6 | 3.927 9 | 18.342 7 | 56.288 2 |
| 19 | 69.388 94 | 0.014 41 | 273.555 8 | 3.942 4 | 18.616 5 | 60.230 6 |
| 20 | 86.736 17 | 0.011 53 | 342.944 7 | 3.953 9 | 18.847 1 | 64.184 5 |
| 21 | 108.420 22 | 0.009 22 | 429.680 9 | 3.963 1 | 19.040 8 | 68.147 6 |
| 22 | 135.525 27 | 0.007 38 | 538.101 1 | 3.970 5 | 19.203 1 | 72.118 1 |
| 23 | 169.406 59 | 0.005 90 | 673.626 4 | 3.976 4 | 19.338 9 | 76.094 4 |
| 24 | 211.758 24 | 0.004 72 | 843.032 9 | 3.981 1 | 19.452 2 | 80.075 6 |
| 25 | 264.697 80 | 0.003 78 | 1 054.791 2 | 3.984 9 | 19.546 7 | 84.060 4 |
| 26 | 330.872 25 | 0.003 02 | 1 319.489 0 | 3.987 9 | 19.625 2 | 88.048 4 |
| 27 | 413.590 31 | 0.002 42 | 1 650.361 2 | 3.990 3 | 19.690 5 | 92.038 7 |
| 28 | 516.987 88 | 0.001 93 | 2 063.951 5 | 3.992 3 | 19.744 7 | 96.030 9 |
| 29 | 646.234 85 | 0.001 55 | 2 580.939 4 | 3.993 8 | 19.789 6 | 100.024 8 |
| 30 | 807.793 57 | 0.001 24 | 3 227.174 3 | 3.995 0 | 19.826 7 | 104.019 8 |
| 31 | 1 009.741 96 | 0.000 99 | 4 034.967 8 | 3.996 0 | 19.857 4 | 108.015 8 |
| 32 | 1 262.177 45 | 0.000 79 | 5 044.709 8 | 3.996 8 | 19.882 7 | 112.012 7 |
| 33 | 1 577.721 81 | 0.000 63 | 6 306.887 2 | 3.997 5 | 19.903 7 | 116.010 1 |
| 34 | 1 972.152 26 | 0.000 51 | 7 884.609 1 | 3.998 0 | 19.920 9 | 120.008 1 |
| 35 | 2 465.190 33 | 0.000 41 | 9 856.761 3 | 3.998 4 | 19.935 1 | 124.006 5 |
| 36 | 3 081.487 91 | 0.000 32 | 12 321.951 6 | 3.998 7 | 19.946 8 | 128.005 2 |
| 37 | 3 851.859 89 | 0.000 26 | 15 403.439 6 | 3.999 0 | 19.956 4 | 132.004 2 |
| 38 | 4 814.824 86 | 0.000 21 | 19 255.299 4 | 3.999 2 | 19.964 3 | 136.003 3 |
| 39 | 6 018.531 08 | 0.000 17 | 24 070.124 3 | 3.999 3 | 19.970 8 | 140.002 7 |
| 40 | 7 523.163 85 | 0.000 13 | 30 088.655 4 | 3.999 5 | 19.976 1 | 144.002 1 |
| 41 | 9 403.954 81 | 0.000 11 | 37 611.819 2 | 3.999 6 | 19.980 4 | 148.001 7 |
| 42 | 11 754.943 51 | 0.000 09 | 47 015.774 0 | 3.999 7 | 19.984 0 | 152.001 4 |
| 43 | 14 693.679 39 | 0.000 07 | 58 770.717 5 | 3.999 7 | 19.986 9 | 156.001 1 |
| 44 | 18 367.099 23 | 0.000 05 | 73 464.396 9 | 3.999 8 | 19.989 3 | 160.000 9 |
| 45 | 22 958.874 04 | 0.000 04 | 91 831.496 2 | 3.999 8 | 19.991 3 | 164.000 7 |
| 46 | 28 698.592 55 | 0.000 03 | 114 790.370 2 | 3.999 9 | 19.992 9 | 168.000 6 |
| 47 | 35 873.240 69 | 0.000 03 | 143 488.962 7 | 3.999 9 | 19.994 2 | 172.000 4 |
| 48 | 44 841.550 86 | 0.000 02 | 179 362.203 4 | 3.999 9 | 19.995 3 | 176.000 4 |
| 49 | 56 051.938 57 | 0.000 02 | 224 203.754 3 | 3.999 9 | 19.996 1 | 180.000 3 |
| 50 | 70 064.923 22 | 0.000 01 | 280 255.692 9 | 3.999 9 | 19.996 9 | 184.000 2 |

# Показатели таблиц смертности

## Показатели таблиц смертности

| $x$ | $l_x$ | $d_x$ | $p_x$ | $q_x$ | $\mu_x$ | $e_x$ |
|---|---|---|---|---|---|---|
| 0 | 100 000 | 773 | 0.992 27 | 0.007 73 | | 75.6 |
| 1 | 99 227 | 294 | 0.997 04 | 0.002 96 | 0.005 37 | 75.2 |
| 2 | 98 933 | 50 | 0.999 49 | 0.000 51 | 0.001 74 | 74.5 |
| 3 | 98 883 | 35 | 0.999 65 | 0.000 35 | 0.000 43 | 73.5 |
| 4 | 98 848 | 27 | 0.999 73 | 0.000 27 | 0.000 31 | 72.5 |
| 5 | 98 821 | 24 | 0.999 76 | 0.000 24 | 0.000 26 | 71.5 |
| 6 | 98 797 | 23 | 0.999 77 | 0.000 23 | 0.000 24 | 70.6 |
| 7 | 98 774 | 22 | 0.999 78 | 0.000 22 | 0.000 23 | 69.6 |
| 8 | 98 752 | 21 | 0.999 79 | 0.000 21 | 0.000 22 | 68.6 |
| 9 | 98 731 | 20 | 0.999 80 | 0.000 20 | 0.000 21 | 67.6 |
| 10 | 98 711 | 19 | 0.999 81 | 0.000 19 | 0.000 20 | 66.6 |
| 11 | 98 692 | 19 | 0.999 81 | 0.000 19 | 0.000 19 | 65.6 |
| 12 | 98 673 | 22 | 0.999 78 | 0.000 22 | 0.000 21 | 64.6 |
| 13 | 98 651 | 26 | 0.999 74 | 0.000 26 | 0.000 24 | 63.7 |
| 14 | 98 625 | 33 | 0.999 67 | 0.000 33 | 0.000 30 | 62.7 |
| 15 | 98 592 | 37 | 0.999 62 | 0.000 38 | 0.000 36 | 61.7 |
| 16 | 98 555 | 43 | 0.999 56 | 0.000 44 | 0.000 41 | 60.7 |
| 17 | 98 512 | 51 | 0.999 48 | 0.000 52 | 0.000 48 | 59.7 |
| 18 | 98 461 | 54 | 0.999 45 | 0.000 55 | 0.000 53 | 58.8 |
| 19 | 98 407 | 58 | 0.999 41 | 0.000 59 | 0.000 57 | 57.8 |
| 20 | 98 349 | 58 | 0.999 41 | 0.000 59 | 0.000 59 | 56.8 |
| 21 | 98 291 | 61 | 0.999 38 | 0.000 62 | 0.000 61 | 55.9 |
| 22 | 98 230 | 66 | 0.999 33 | 0.000 67 | 0.000 65 | 54.9 |
| 23 | 98 164 | 72 | 0.999 27 | 0.000 73 | 0.000 70 | 53.9 |
| 24 | 98 092 | 79 | 0.999 19 | 0.000 81 | 0.000 77 | 53.0 |
| 25 | 98 013 | 87 | 0.999 11 | 0.000 89 | 0.000 85 | 52.0 |
| 26 | 97 926 | 95 | 0.999 03 | 0.000 97 | 0.000 93 | 51.1 |
| 27 | 97 831 | 108 | 0.998 90 | 0.001 10 | 0.001 04 | 50.1 |
| 28 | 97 723 | 122 | 0.998 75 | 0.001 25 | 0.001 18 | 49.2 |
| 29 | 97 601 | 140 | 0.998 57 | 0.001 43 | 0.001 34 | 48.2 |
| 30 | 97 461 | 153 | 0.998 43 | 0.001 57 | 0.001 50 | 47.3 |
| 31 | 97 308 | 166 | 0.998 29 | 0.001 71 | 0.001 64 | 46.4 |
| 32 | 97 142 | 177 | 0.998 18 | 0.001 82 | 0.001 77 | 45.5 |
| 33 | 96 965 | 187 | 0.998 07 | 0.001 93 | 0.001 88 | 44.5 |
| 34 | 96 778 | 198 | 0.997 95 | 0.002 05 | 0.001 99 | 43.6 |
| 35 | 96 580 | 206 | 0.997 87 | 0.002 13 | 0.002 09 | 42.7 |
| 36 | 96 374 | 217 | 0.997 75 | 0.002 25 | 0.002 19 | 41.8 |
| 37 | 96 157 | 223 | 0.997 68 | 0.002 32 | 0.002 29 | 40.9 |
| 38 | 95 934 | 231 | 0.997 59 | 0.002 41 | 0.002 37 | 40.0 |
| 39 | 95 703 | 238 | 0.997 51 | 0.002 49 | 0.002 45 | 39.1 |
| 40 | 95 465 | 247 | 0.997 41 | 0.002 59 | 0.002 54 | 38.2 |
| 41 | 95 218 | 257 | 0.997 30 | 0.002 70 | 0.002 65 | 37.3 |
| 42 | 94 961 | 269 | 0.997 17 | 0.002 83 | 0.002 77 | 36.4 |
| 43 | 94 692 | 287 | 0.996 97 | 0.003 03 | 0.002 94 | 35.5 |
| 44 | 94 405 | 304 | 0.996 78 | 0.003 22 | 0.003 13 | 34.6 |
| 45 | 94 101 | 319 | 0.996 61 | 0.003 39 | 0.003 31 | 33.7 |
| 46 | 93 782 | 333 | 0.996 45 | 0.003 55 | 0.003 48 | 32.8 |
| 47 | 93 449 | 353 | 0.996 22 | 0.003 78 | 0.003 67 | 31.9 |
| 48 | 93 096 | 376 | 0.995 96 | 0.004 04 | 0.003 92 | 31.0 |
| 49 | 92 720 | 404 | 0.995 64 | 0.004 36 | 0.004 21 | 30.2 |

## Показатели таблиц смертности

| $x$ | $l_x$ | $d_x$ | $p_x$ | $q_x$ | $\mu_x$ | $e_x$ |
|---|---|---|---|---|---|---|
| 50 | 92 316 | 424 | 0.995 41 | 0.004 59 | 0.004 48 | 29.3 |
| 51 | 91 892 | 450 | 0.995 10 | 0.004 90 | 0.004 76 | 28.4 |
| 52 | 91 442 | 483 | 0.994 72 | 0.005 28 | 0.005 10 | 27.6 |
| 53 | 90 959 | 516 | 0.994 33 | 0.005 67 | 0.005 49 | 26.7 |
| 54 | 90 443 | 564 | 0.993 76 | 0.006 24 | 0.005 97 | 25.9 |
| 55 | 89 879 | 607 | 0.993 25 | 0.006 75 | 0.006 52 | 25.0 |
| 56 | 89 272 | 667 | 0.992 53 | 0.007 47 | 0.007 14 | 24.2 |
| 57 | 88 605 | 711 | 0.991 98 | 0.008 02 | 0.007 78 | 23.4 |
| 58 | 87 894 | 759 | 0.991 36 | 0.008 64 | 0.008 36 | 22.5 |
| 59 | 87 135 | 819 | 0.990 60 | 0.009 40 | 0.009 06 | 21.7 |
| 60 | 86 316 | 875 | 0.989 86 | 0.010 14 | 0.009 81 | 20.9 |
| 61 | 85 441 | 937 | 0.989 03 | 0.010 97 | 0.010 61 | 20.1 |
| 62 | 84 504 | 1 012 | 0.988 02 | 0.011 98 | 0.011 53 | 19.4 |
| 63 | 83 492 | 1 056 | 0.987 35 | 0.012 65 | 0.012 39 | 18.6 |
| 64 | 82 436 | 1 174 | 0.985 76 | 0.014 24 | 0.013 53 | 17.8 |
| 65 | 81 262 | 1 212 | 0.985 09 | 0.014 91 | 0.014 68 | 17.1 |
| 66 | 80 050 | 1 319 | 0.983 52 | 0.016 48 | 0.015 81 | 16.3 |
| 67 | 78 731 | 1 365 | 0.982 66 | 0.017 34 | 0.017 05 | 15.6 |
| 68 | 77 366 | 1 421 | 0.981 63 | 0.018 37 | 0.018 01 | 14.9 |
| 69 | 75 945 | 1 591 | 0.979 05 | 0.020 95 | 0.019 84 | 14.1 |
| 70 | 74 354 | 1 697 | 0.977 18 | 0.022 82 | 0.022 12 | 13.4 |
| 71 | 72 657 | 1 892 | 0.973 96 | 0.026 04 | 0.024 72 | 12.7 |
| 72 | 70 765 | 2 019 | 0.971 47 | 0.028 53 | 0.027 65 | 12.0 |
| 73 | 68 746 | 2 186 | 0.968 20 | 0.031 80 | 0.030 60 | 11.4 |
| 74 | 66 560 | 2 383 | 0.964 20 | 0.035 80 | 0.034 35 | 10.7 |
| 75 | 64 177 | 2 575 | 0.959 88 | 0.040 12 | 0.038 66 | 10.1 |
| 76 | 61 602 | 2 822 | 0.954 19 | 0.045 81 | 0.043 86 | 9.5 |
| 77 | 58 780 | 2 972 | 0.949 44 | 0.050 56 | 0.049 33 | 9.0 |
| 78 | 55 808 | 3 149 | 0.943 57 | 0.056 43 | 0.054 90 | 8.4 |
| 79 | 52 659 | 3 319 | 0.936 97 | 0.063 03 | 0.061 48 | 7.9 |
| 80 | 49 340 | 3 495 | 0.929 16 | 0.070 84 | 0.069 14 | 7.4 |
| 81 | 45 845 | 3 632 | 0.920 78 | 0.079 22 | 0.077 83 | 6.9 |
| 82 | 42 213 | 3 715 | 0.911 99 | 0.088 01 | 0.087 12 | 6.5 |
| 83 | 38 498 | 3 793 | 0.901 48 | 0.098 52 | 0.097 64 | 6.0 |
| 84 | 34 705 | 3 788 | 0.890 85 | 0.109 15 | 0.109 33 | 5.6 |
| 85 | 30 917 | 3 713 | 0.879 90 | 0.120 10 | 0.121 38 | 5.3 |
| 86 | 27 204 | 3 571 | 0.868 73 | 0.131 27 | 0.133 90 | 4.9 |
| 87 | 23 633 | 3 447 | 0.854 14 | 0.145 86 | 0.148 56 | 4.6 |
| 88 | 20 186 | 3 186 | 0.842 17 | 0.157 83 | 0.164 14 | 4.3 |
| 89 | 17 000 | 2 947 | 0.826 65 | 0.173 35 | 0.180 24 | 4.0 |
| 90 | 14 053 | 2 587 | 0.815 91 | 0.184 09 | 0.196 27 | 3.7 |
| 91 | 11 466 | 2 315 | 0.798 10 | 0.201 90 | 0.213 31 | 3.4 |
| 92 | 9 151 | 2 026 | 0.778 60 | 0.221 40 | 0.236 42 | 3.2 |
| 93 | 7 125 | 1 724 | 0.758 04 | 0.241 96 | 0.261 89 | 2.9 |
| 94 | 5 401 | 1 386 | 0.743 38 | 0.256 62 | 0.285 40 | 2.7 |
| 95 | 4 015 | 1 082 | 0.730 51 | 0.269 49 | 0.303 96 | 2.5 |
| 96 | 2 933 | 843 | 0.712 58 | 0.287 42 | 0.324 43 | 2.2 |
| 97 | 2 090 | 628 | 0.699 52 | 0.300 48 | 0.346 52 | 1.9 |
| 98 | 1 462 | 449 | 0.692 89 | 0.307 11 | 0.361 27 | 1.5 |
| 99 | 1 013 | 543 | 0.463 97 | 0.536 03 | 0.512 17 | 1.0 |
| 100 | 470 | 470 | 0.000 00 | 1.000 00 | | 0.5 |

## Показатели таблиц смертности

| $x$ | $l_{[x]}$ | $l_{[x-1]+1}$ | $l_x$ |
|---|---|---|---|
| 0 | 99 810 | | 100 000 |
| 1 | 99 162 | 99 197 | 99 227 |
| 2 | 98 919 | 98 928 | 98 933 |
| 3 | 98 873 | 98 879 | 98 883 |
| 4 | 98 840 | 98 845 | 98 848 |
| 5 | 98 814 | 98 819 | 98 821 |
| 6 | 98 790 | 98 795 | 98 797 |
| 7 | 98 768 | 98 772 | 98 774 |
| 8 | 98 746 | 98 750 | 98 752 |
| 9 | 98 725 | 98 729 | 98 731 |
| 10 | 98 705 | 98 709 | 98 711 |
| 11 | 98 686 | 98 690 | 98 692 |
| 12 | 98 666 | 98 671 | 98 673 |
| 13 | 98 642 | 98 648 | 98 651 |
| 14 | 98 615 | 98 621 | 98 625 |
| 15 | 98 580 | 98 588 | 98 592 |
| 16 | 98 542 | 98 551 | 98 555 |
| 17 | 98 496 | 98 507 | 98 512 |
| 18 | 98 443 | 98 456 | 98 461 |
| 19 | 98 386 | 98 401 | 98 407 |
| 20 | 98 327 | 98 342 | 98 349 |
| 21 | 98 266 | 98 283 | 98 291 |
| 22 | 98 201 | 98 221 | 98 230 |
| 23 | 98 131 | 98 154 | 98 164 |
| 24 | 98 055 | 98 081 | 98 092 |
| 25 | 97 971 | 98 000 | 98 013 |
| 26 | 97 878 | 97 912 | 97 926 |
| 27 | 97 777 | 97 815 | 97 831 |
| 28 | 97 661 | 97 705 | 97 723 |
| 29 | 97 532 | 97 580 | 97 601 |
| 30 | 97 386 | 97 438 | 97 461 |
| 31 | 97 229 | 97 284 | 97 308 |
| 32 | 97 059 | 97 117 | 97 142 |
| 33 | 96 879 | 96 939 | 96 965 |
| 34 | 96 689 | 96 750 | 96 778 |
| 35 | 96 488 | 96 551 | 96 580 |
| 36 | 96 278 | 96 343 | 96 374 |
| 37 | 96 058 | 96 125 | 96 157 |
| 38 | 95 830 | 95 900 | 95 934 |
| 39 | 95 594 | 95 666 | 95 703 |
| 40 | 95 348 | 95 425 | 95 465 |
| 41 | 95 092 | 95 175 | 95 218 |
| 42 | 94 824 | 94 913 | 94 961 |
| 43 | 94 540 | 94 638 | 94 692 |
| 44 | 94 238 | 94 345 | 94 405 |
| 45 | 93 919 | 94 035 | 94 101 |
| 46 | 93 583 | 93 709 | 93 782 |
| 47 | 93 229 | 93 368 | 93 449 |
| 48 | 92 851 | 93 005 | 93 096 |
| 49 | 92 449 | 92 617 | 92 720 |

## Показатели таблиц смертности

| $x$ | $l_{[x]}$ | $l_{[x-1]+1}$ | $l_x$ |
|---|---|---|---|
| 50 | 92 020 | 92 203 | 92 316 |
| 51 | 91 564 | 91 767 | 91 892 |
| 52 | 91 078 | 91 302 | 91 442 |
| 53 | 90 552 | 90 803 | 90 959 |
| 54 | 89 986 | 90 266 | 90 443 |
| 55 | 89 366 | 89 681 | 89 879 |
| 56 | 88 699 | 89 047 | 89 272 |
| 57 | 87 975 | 88 356 | 88 605 |
| 58 | 87 198 | 87 619 | 87 894 |
| 59 | 86 366 | 86 829 | 87 135 |
| 60 | 85 471 | 85 979 | 86 316 |
| 61 | 84 509 | 85 069 | 85 441 |
| 62 | 83 488 | 84 091 | 84 504 |
| 63 | 82 375 | 83 049 | 83 492 |
| 64 | 81 206 | 81 930 | 82 436 |
| 65 | 79 933 | 80 726 | 81 262 |
| 66 | 78 605 | 79 452 | 80 050 |
| 67 | 77 201 | 78 098 | 78 731 |
| 68 | 75 687 | 76 692 | 77 366 |
| 69 | 74 070 | 75 173 | 75 945 |
| 70 | 72 274 | 73 513 | 74 354 |
| 71 | 70 342 | 71 699 | 72 657 |
| 72 | 68 235 | 69 722 | 70 765 |
| 73 | 65 950 | 67 595 | 68 746 |
| 74 | 63 474 | 65 281 | 66 560 |
| 75 | 60 765 | 62 769 | 64 177 |
| 76 | 57 873 | 60 031 | 61 602 |
| 77 | 54 782 | 57 097 | 58 780 |
| 78 | 51 520 | 53 995 | 55 808 |
| 79 | 48 075 | 50 717 | 52 659 |
| 80 | 44 474 | 47 262 | 49 340 |
| 81 | | 43 652 | 45 845 |
| 82 | | | 42 213 |
| 83 | | | 38 498 |
| 84 | | | 34 705 |
| 85 | | | 30 917 |
| 86 | | | 27 204 |
| 87 | | | 23 633 |
| 88 | | | 20 186 |
| 89 | | | 17 000 |
| 90 | | | 14 053 |
| 91 | | | 11 466 |
| 92 | | | 9 151 |
| 93 | | | 7 125 |
| 94 | | | 5 401 |
| 95 | | | 4 015 |
| 96 | | | 2 933 |
| 97 | | | 2 090 |
| 98 | | | 1 462 |
| 99 | | | 1 013 |
| 100 | | | 470 |

## Показатели таблиц смертности

| $x$ | $d_{[x]}$ | $d_{[x-1]+1}$ | $d_x$ |
|---|---|---|---|
| 0 | 613 | | 773 |
| 1 | 234 | 264 | 294 |
| 2 | 40 | 45 | 50 |
| 3 | 28 | 31 | 35 |
| 4 | 21 | 24 | 27 |
| 5 | 19 | 22 | 24 |
| 6 | 18 | 21 | 23 |
| 7 | 18 | 20 | 22 |
| 8 | 17 | 19 | 21 |
| 9 | 16 | 18 | 20 |
| 10 | 15 | 17 | 19 |
| 11 | 15 | 17 | 19 |
| 12 | 18 | 20 | 22 |
| 13 | 21 | 23 | 26 |
| 14 | 27 | 29 | 33 |
| 15 | 29 | 33 | 37 |
| 16 | 35 | 39 | 43 |
| 17 | 40 | 46 | 51 |
| 18 | 42 | 49 | 54 |
| 19 | 44 | 52 | 58 |
| 20 | 44 | 51 | 58 |
| 21 | 45 | 53 | 61 |
| 22 | 47 | 57 | 66 |
| 23 | 50 | 62 | 72 |
| 24 | 55 | 68 | 79 |
| 25 | 59 | 74 | 87 |
| 26 | 63 | 81 | 95 |
| 27 | 72 | 92 | 108 |
| 28 | 81 | 104 | 122 |
| 29 | 94 | 119 | 140 |
| 30 | 102 | 130 | 153 |
| 31 | 112 | 142 | 166 |
| 32 | 120 | 152 | 177 |
| 33 | 129 | 161 | 187 |
| 34 | 138 | 170 | 198 |
| 35 | 145 | 177 | 206 |
| 36 | 153 | 186 | 217 |
| 37 | 158 | 191 | 223 |
| 38 | 164 | 197 | 231 |
| 39 | 169 | 201 | 238 |
| 40 | 173 | 207 | 247 |
| 41 | 179 | 214 | 257 |
| 42 | 186 | 221 | 269 |
| 43 | 195 | 233 | 287 |
| 44 | 203 | 244 | 304 |
| 45 | 210 | 253 | 319 |
| 46 | 215 | 260 | 333 |
| 47 | 224 | 272 | 353 |
| 48 | 234 | 285 | 376 |
| 49 | 246 | 301 | 404 |

## Показатели таблиц смертности

| $x$ | $d_{[x]}$ | $d_{[x-1]+1}$ | $d_x$ |
|---|---|---|---|
| 50 | 253 | 311 | 424 |
| 51 | 262 | 325 | 450 |
| 52 | 275 | 343 | 483 |
| 53 | 286 | 360 | 516 |
| 54 | 305 | 387 | 564 |
| 55 | 319 | 409 | 607 |
| 56 | 343 | 442 | 667 |
| 57 | 356 | 462 | 711 |
| 58 | 369 | 484 | 759 |
| 59 | 387 | 513 | 819 |
| 60 | 402 | 538 | 875 |
| 61 | 418 | 565 | 937 |
| 62 | 439 | 599 | 1 012 |
| 63 | 445 | 613 | 1 056 |
| 64 | 480 | 668 | 1 174 |
| 65 | 481 | 676 | 1 212 |
| 66 | 507 | 721 | 1 319 |
| 67 | 509 | 732 | 1 365 |
| 68 | 514 | 747 | 1 421 |
| 69 | 557 | 819 | 1 591 |
| 70 | 575 | 856 | 1 697 |
| 71 | 620 | 934 | 1 892 |
| 72 | 640 | 976 | 2 019 |
| 73 | 669 | 1 035 | 2 186 |
| 74 | 705 | 1 104 | 2 383 |
| 75 | 734 | 1 167 | 2 575 |
| 76 | 776 | 1 251 | 2 822 |
| 77 | 787 | 1 289 | 2 972 |
| 78 | 803 | 1 336 | 3 149 |
| 79 | 813 | 1 377 | 3 319 |
| 80 | 822 | 1 417 | 3 495 |
| 81 | | 1 439 | 3 632 |
| 82 | | | 3 715 |
| 83 | | | 3 793 |
| 84 | | | 3 788 |
| 85 | | | 3 713 |
| 86 | | | 3 571 |
| 87 | | | 3 447 |
| 88 | | | 3 186 |
| 89 | | | 2 947 |
| 90 | | | 2 587 |
| 91 | | | 2 315 |
| 92 | | | 2 026 |
| 93 | | | 1 724 |
| 94 | | | 1 386 |
| 95 | | | 1 082 |
| 96 | | | 843 |
| 97 | | | 628 |
| 98 | | | 449 |
| 99 | | | 543 |
| 100 | | | 470 |

## Показатели таблиц смертности

| $x$ | $q_{[x]}$ | $q_{[x-1]+1}$ | $q_x$ |
|---|---|---|---|
| 0 | 0.006 14 | | 0.007 73 |
| 1 | 0.002 35 | 0.002 66 | 0.002 96 |
| 2 | 0.000 40 | 0.000 46 | 0.000 51 |
| 3 | 0.000 28 | 0.000 32 | 0.000 35 |
| 4 | 0.000 22 | 0.000 25 | 0.000 27 |
| 5 | 0.000 19 | 0.000 22 | 0.000 24 |
| 6 | 0.000 19 | 0.000 21 | 0.000 23 |
| 7 | 0.000 18 | 0.000 20 | 0.000 22 |
| 8 | 0.000 17 | 0.000 19 | 0.000 21 |
| 9 | 0.000 16 | 0.000 18 | 0.000 20 |
| 10 | 0.000 16 | 0.000 17 | 0.000 19 |
| 11 | 0.000 16 | 0.000 17 | 0.000 19 |
| 12 | 0.000 18 | 0.000 20 | 0.000 22 |
| 13 | 0.000 21 | 0.000 24 | 0.000 26 |
| 14 | 0.000 27 | 0.000 30 | 0.000 33 |
| 15 | 0.000 30 | 0.000 34 | 0.000 38 |
| 16 | 0.000 35 | 0.000 39 | 0.000 44 |
| 17 | 0.000 41 | 0.000 47 | 0.000 52 |
| 18 | 0.000 43 | 0.000 49 | 0.000 55 |
| 19 | 0.000 45 | 0.000 53 | 0.000 59 |
| 20 | 0.000 44 | 0.000 52 | 0.000 59 |
| 21 | 0.000 45 | 0.000 54 | 0.000 62 |
| 22 | 0.000 48 | 0.000 58 | 0.000 67 |
| 23 | 0.000 51 | 0.000 63 | 0.000 73 |
| 24 | 0.000 55 | 0.000 69 | 0.000 81 |
| 25 | 0.000 60 | 0.000 76 | 0.000 89 |
| 26 | 0.000 65 | 0.000 83 | 0.000 97 |
| 27 | 0.000 74 | 0.000 94 | 0.001 10 |
| 28 | 0.000 83 | 0.001 06 | 0.001 25 |
| 29 | 0.000 95 | 0.001 22 | 0.001 43 |
| 30 | 0.001 05 | 0.001 34 | 0.001 57 |
| 31 | 0.001 15 | 0.001 46 | 0.001 71 |
| 32 | 0.001 24 | 0.001 56 | 0.001 82 |
| 33 | 0.001 33 | 0.001 66 | 0.001 93 |
| 34 | 0.001 43 | 0.001 76 | 0.002 05 |
| 35 | 0.001 50 | 0.001 84 | 0.002 13 |
| 36 | 0.001 59 | 0.001 93 | 0.002 25 |
| 37 | 0.001 65 | 0.001 99 | 0.002 32 |
| 38 | 0.001 71 | 0.002 05 | 0.002 41 |
| 39 | 0.001 76 | 0.002 10 | 0.002 49 |
| 40 | 0.001 82 | 0.002 17 | 0.002 59 |
| 41 | 0.001 88 | 0.002 24 | 0.002 70 |
| 42 | 0.001 96 | 0.002 33 | 0.002 83 |
| 43 | 0.002 07 | 0.002 46 | 0.003 03 |
| 44 | 0.002 16 | 0.002 59 | 0.003 22 |
| 45 | 0.002 24 | 0.002 69 | 0.003 39 |
| 46 | 0.002 31 | 0.002 77 | 0.003 55 |
| 47 | 0.002 41 | 0.002 91 | 0.003 78 |
| 48 | 0.002 52 | 0.003 06 | 0.004 04 |
| 49 | 0.002 66 | 0.003 25 | 0.004 36 |

## Показатели таблиц смертности

| $x$ | $q_{[x]}$ | $q_{[x-1]+1}$ | $q_x$ |
|---|---|---|---|
| 50 | 0.002 75 | 0.003 38 | 0.004 59 |
| 51 | 0.002 86 | 0.003 54 | 0.004 90 |
| 52 | 0.003 01 | 0.003 76 | 0.005 28 |
| 53 | 0.003 16 | 0.003 97 | 0.005 67 |
| 54 | 0.003 39 | 0.004 29 | 0.006 24 |
| 55 | 0.003 58 | 0.004 56 | 0.006 75 |
| 56 | 0.003 86 | 0.004 96 | 0.007 47 |
| 57 | 0.004 04 | 0.005 23 | 0.008 02 |
| 58 | 0.004 23 | 0.005 53 | 0.008 64 |
| 59 | 0.004 48 | 0.005 91 | 0.009 40 |
| 60 | 0.004 71 | 0.006 26 | 0.010 14 |
| 61 | 0.004 95 | 0.006 64 | 0.010 97 |
| 62 | 0.005 26 | 0.007 12 | 0.011 98 |
| 63 | 0.005 40 | 0.007 38 | 0.012 65 |
| 64 | 0.005 91 | 0.008 15 | 0.014 24 |
| 65 | 0.006 01 | 0.008 38 | 0.014 91 |
| 66 | 0.006 46 | 0.009 08 | 0.016 48 |
| 67 | 0.006 60 | 0.009 37 | 0.017 34 |
| 68 | 0.006 79 | 0.009 74 | 0.018 37 |
| 69 | 0.007 52 | 0.010 89 | 0.020 95 |
| 70 | 0.007 96 | 0.011 64 | 0.022 82 |
| 71 | 0.008 81 | 0.013 03 | 0.026 04 |
| 72 | 0.009 38 | 0.014 00 | 0.028 53 |
| 73 | 0.010 15 | 0.015 31 | 0.031 80 |
| 74 | 0.011 10 | 0.016 91 | 0.035 80 |
| 75 | 0.012 08 | 0.018 60 | 0.040 12 |
| 76 | 0.013 39 | 0.020 84 | 0.045 81 |
| 77 | 0.014 36 | 0.022 58 | 0.050 56 |
| 78 | 0.015 57 | 0.024 75 | 0.056 43 |
| 79 | 0.016 91 | 0.027 16 | 0.063 03 |
| 80 | 0.018 48 | 0.029 99 | 0.070 84 |
| 81 | | 0.032 97 | 0.079 22 |
| 82 | | | 0.088 01 |
| 83 | | | 0.098 52 |
| 84 | | | 0.109 15 |
| 85 | | | 0.120 10 |
| 86 | | | 0.131 27 |
| 87 | | | 0.145 86 |
| 88 | | | 0.157 83 |
| 89 | | | 0.173 35 |
| 90 | | | 0.184 09 |
| 91 | | | 0.201 90 |
| 92 | | | 0.221 40 |
| 93 | | | 0.241 96 |
| 94 | | | 0.256 62 |
| 95 | | | 0.269 49 |
| 96 | | | 0.287 42 |
| 97 | | | 0.300 48 |
| 98 | | | 0.307 11 |
| 99 | | | 0.536 03 |
| 100 | | | 1.000 00 |

## Показатели таблиц смертности

| $x$ | $\ddot{a}_x$ | $A_x$ | ${}^2A_x$ | $(I\ddot{a})_x$ | $(IA)_x^{4\%}$ |
|---|---|---|---|---|---|
| 0 | 24.14 | 0.071 | 0.018 | 526.93 | 3.863 |
| 1 | 24.25 | 0.067 | 0.012 | 526.98 | 3.974 |
| 2 | 24.25 | 0.067 | 0.010 | 524.39 | 4.075 |
| 3 | 24.20 | 0.069 | 0.010 | 520.40 | 4.171 |
| 4 | 24.13 | 0.072 | 0.011 | 516.24 | 4.267 |
| 5 | 24.06 | 0.074 | 0.011 | 511.93 | 4.364 |
| 6 | 23.99 | 0.077 | 0.012 | 507.50 | 4.463 |
| 7 | 23.92 | 0.080 | 0.013 | 502.97 | 4.562 |
| 8 | 23.84 | 0.083 | 0.013 | 498.32 | 4.662 |
| 9 | 23.76 | 0.086 | 0.014 | 493.57 | 4.764 |
| 10 | 23.67 | 0.089 | 0.015 | 488.70 | 4.866 |
| 11 | 23.59 | 0.093 | 0.016 | 483.72 | 4.968 |
| 12 | 23.49 | 0.096 | 0.018 | 478.63 | 5.071 |
| 13 | 23.40 | 0.100 | 0.019 | 473.45 | 5.175 |
| 14 | 23.30 | 0.104 | 0.020 | 468.18 | 5.280 |
| 15 | 23.20 | 0.108 | 0.021 | 462.83 | 5.385 |
| 16 | 23.10 | 0.111 | 0.023 | 457.38 | 5.491 |
| 17 | 22.99 | 0.116 | 0.024 | 451.85 | 5.597 |
| 18 | 22.88 | 0.120 | 0.026 | 446.25 | 5.703 |
| 19 | 22.77 | 0.124 | 0.027 | 440.54 | 5.810 |
| 20 | 22.65 | 0.128 | 0.029 | 434.74 | 5.917 |
| 21 | 22.53 | 0.133 | 0.031 | 428.82 | 6.024 |
| 22 | 22.41 | 0.138 | 0.032 | 422.80 | 6.130 |
| 23 | 22.28 | 0.143 | 0.034 | 416.69 | 6.236 |
| 24 | 22.15 | 0.148 | 0.037 | 410.49 | 6.342 |
| 25 | 22.01 | 0.153 | 0.039 | 404.20 | 6.447 |
| 26 | 21.87 | 0.159 | 0.041 | 397.83 | 6.551 |
| 27 | 21.73 | 0.164 | 0.043 | 391.37 | 6.655 |
| 28 | 21.58 | 0.170 | 0.046 | 384.86 | 6.757 |
| 29 | 21.43 | 0.175 | 0.049 | 378.28 | 6.860 |
| 30 | 21.28 | 0.181 | 0.051 | 371.66 | 6.962 |
| 31 | 21.12 | 0.187 | 0.054 | 364.97 | 7.063 |
| 32 | 20.96 | 0.193 | 0.057 | 358.21 | 7.163 |
| 33 | 20.80 | 0.200 | 0.060 | 351.38 | 7.261 |
| 34 | 20.63 | 0.206 | 0.063 | 344.47 | 7.358 |
| 35 | 20.46 | 0.213 | 0.066 | 337.48 | 7.453 |
| 36 | 20.28 | 0.220 | 0.069 | 330.41 | 7.546 |
| 37 | 20.10 | 0.227 | 0.073 | 323.27 | 7.637 |
| 38 | 19.91 | 0.234 | 0.077 | 316.03 | 7.724 |
| 39 | 19.71 | 0.242 | 0.081 | 308.71 | 7.809 |
| 40 | 19.51 | 0.249 | 0.085 | 301.31 | 7.890 |
| 41 | 19.30 | 0.257 | 0.089 | 293.84 | 7.966 |
| 42 | 19.08 | 0.266 | 0.094 | 286.30 | 8.039 |
| 43 | 18.86 | 0.274 | 0.099 | 278.70 | 8.107 |
| 44 | 18.63 | 0.283 | 0.105 | 271.06 | 8.171 |
| 45 | 18.39 | 0.292 | 0.110 | 263.38 | 8.230 |
| 46 | 18.15 | 0.301 | 0.116 | 255.65 | 8.284 |
| 47 | 17.90 | 0.311 | 0.123 | 247.88 | 8.331 |
| 48 | 17.64 | 0.321 | 0.130 | 240.09 | 8.373 |
| 49 | 17.38 | 0.331 | 0.137 | 232.29 | 8.408 |

## Показатели таблиц смертности

4%

| $x$ | $\ddot{a}_x$ | $A_x$ | ${}^2A_x$ | $(I\ddot{a})_x$ | $(IA)_x$ |
|---|---|---|---|---|---|
| 50 | 17.11 | 0.341 | 0.144 | 224.49 | 8.437 |
| 51 | 16.83 | 0.352 | 0.152 | 216.67 | 8.458 |
| 52 | 16.54 | 0.363 | 0.160 | 208.86 | 8.471 |
| 53 | 16.25 | 0.374 | 0.169 | 201.07 | 8.478 |
| 54 | 15.95 | 0.386 | 0.178 | 193.31 | 8.475 |
| 55 | 15.64 | 0.397 | 0.188 | 185.62 | 8.466 |
| 56 | 15.33 | 0.409 | 0.197 | 177.97 | 8.449 |
| 57 | 15.02 | 0.421 | 0.208 | 170.42 | 8.424 |
| 58 | 14.70 | 0.434 | 0.218 | 162.92 | 8.390 |
| 59 | 14.37 | 0.446 | 0.229 | 155.49 | 8.346 |
| 60 | 14.04 | 0.459 | 0.241 | 148.16 | 8.294 |
| 61 | 13.70 | 0.472 | 0.253 | 140.92 | 8.232 |
| 62 | 13.35 | 0.485 | 0.266 | 133.77 | 8.160 |
| 63 | 13.00 | 0.499 | 0.279 | 126.76 | 8.078 |
| 64 | 12.64 | 0.512 | 0.293 | 119.82 | 7.984 |
| 65 | 12.28 | 0.526 | 0.307 | 113.08 | 7.882 |
| 66 | 11.91 | 0.540 | 0.322 | 106.41 | 7.766 |
| 67 | 11.54 | 0.555 | 0.337 | 99.93 | 7.641 |
| 68 | 11.15 | 0.569 | 0.353 | 93.55 | 7.500 |
| 69 | 10.76 | 0.585 | 0.370 | 87.30 | 7.342 |
| 70 | 10.36 | 0.600 | 0.388 | 81.30 | 7.178 |
| 71 | 9.97 | 0.615 | 0.406 | 75.50 | 7.002 |
| 72 | 9.57 | 0.630 | 0.424 | 69.98 | 6.820 |
| 73 | 9.18 | 0.645 | 0.443 | 64.67 | 6.627 |
| 74 | 8.78 | 0.660 | 0.462 | 59.60 | 6.426 |
| 75 | 8.40 | 0.674 | 0.481 | 54.81 | 6.220 |
| 76 | 8.01 | 0.689 | 0.500 | 50.29 | 6.008 |
| 77 | 7.65 | 0.703 | 0.519 | 46.08 | 5.798 |
| 78 | 7.28 | 0.717 | 0.538 | 42.10 | 5.581 |
| 79 | 6.92 | 0.730 | 0.556 | 38.38 | 5.362 |
| 80 | 6.57 | 0.743 | 0.575 | 34.92 | 5.141 |
| 81 | 6.24 | 0.755 | 0.593 | 31.73 | 4.922 |
| 82 | 5.91 | 0.767 | 0.611 | 28.79 | 4.706 |
| 83 | 5.60 | 0.778 | 0.628 | 26.09 | 4.492 |
| 84 | 5.31 | 0.789 | 0.644 | 23.63 | 4.284 |
| 85 | 5.03 | 0.798 | 0.659 | 21.39 | 4.081 |
| 86 | 4.77 | 0.807 | 0.674 | 19.33 | 3.880 |
| 87 | 4.51 | 0.815 | 0.688 | 17.44 | 3.678 |
| 88 | 4.27 | 0.822 | 0.700 | 15.74 | 3.486 |
| 89 | 4.04 | 0.827 | 0.711 | 14.16 | 3.291 |
| 90 | 3.83 | 0.831 | 0.721 | 12.73 | 3.099 |
| 91 | 3.60 | 0.834 | 0.730 | 11.34 | 2.891 |
| 92 | 3.39 | 0.833 | 0.737 | 10.09 | 2.681 |
| 93 | 3.20 | 0.829 | 0.739 | 8.94 | 2.468 |
| 94 | 3.02 | 0.818 | 0.736 | 7.88 | 2.249 |
| 95 | 2.82 | 0.799 | 0.725 | 6.80 | 2.003 |
| 96 | 2.59 | 0.769 | 0.705 | 5.67 | 1.714 |
| 97 | 2.32 | 0.719 | 0.667 | 4.49 | 1.379 |
| 98 | 1.96 | 0.639 | 0.601 | 3.22 | 0.982 |
| 99 | 1.45 | 0.515 | 0.496 | 1.89 | 0.515 |
| 100 | 1.00 | 0.000 | 0.000 | 1.00 | 0.000 |

## Показатели таблиц смертности

| $x$ | $\ddot{a}_{[x]}$ | $A_{[x]}$ | ${}^{2}A_{[x]}$ | $(I\ddot{a})_{[x]}$ | $(IA)^{4\%}_{[x]}$ |
|---|---|---|---|---|---|
| 0 | 24.18 | 0.070 | 0.016 | 527.93 | 3.868 |
| 1 | 24.27 | 0.067 | 0.011 | 527.32 | 3.976 |
| 2 | 24.26 | 0.067 | 0.010 | 524.46 | 4.076 |
| 3 | 24.20 | 0.069 | 0.010 | 520.45 | 4.171 |
| 4 | 24.13 | 0.072 | 0.011 | 516.28 | 4.267 |
| 5 | 24.07 | 0.074 | 0.011 | 511.96 | 4.364 |
| 6 | 23.99 | 0.077 | 0.012 | 507.54 | 4.463 |
| 7 | 23.92 | 0.080 | 0.013 | 503.00 | 4.562 |
| 8 | 23.84 | 0.083 | 0.013 | 498.35 | 4.663 |
| 9 | 23.76 | 0.086 | 0.014 | 493.60 | 4.764 |
| 10 | 23.68 | 0.089 | 0.015 | 488.73 | 4.866 |
| 11 | 23.59 | 0.093 | 0.016 | 483.75 | 4.968 |
| 12 | 23.49 | 0.096 | 0.017 | 478.66 | 5.072 |
| 13 | 23.40 | 0.100 | 0.019 | 473.49 | 5.176 |
| 14 | 23.30 | 0.104 | 0.020 | 468.22 | 5.280 |
| 15 | 23.20 | 0.107 | 0.021 | 462.88 | 5.386 |
| 16 | 23.10 | 0.111 | 0.023 | 457.44 | 5.491 |
| 17 | 22.99 | 0.115 | 0.024 | 451.93 | 5.598 |
| 18 | 22.89 | 0.120 | 0.025 | 446.33 | 5.704 |
| 19 | 22.77 | 0.124 | 0.027 | 440.63 | 5.811 |
| 20 | 22.66 | 0.128 | 0.029 | 434.84 | 5.918 |
| 21 | 22.54 | 0.133 | 0.030 | 428.93 | 6.025 |
| 22 | 22.41 | 0.138 | 0.032 | 422.93 | 6.131 |
| 23 | 22.29 | 0.143 | 0.034 | 416.83 | 6.238 |
| 24 | 22.16 | 0.148 | 0.036 | 410.64 | 6.343 |
| 25 | 22.02 | 0.153 | 0.038 | 404.37 | 6.449 |
| 26 | 21.88 | 0.158 | 0.041 | 398.02 | 6.553 |
| 27 | 21.74 | 0.164 | 0.043 | 391.59 | 6.658 |
| 28 | 21.59 | 0.169 | 0.045 | 385.10 | 6.761 |
| 29 | 21.44 | 0.175 | 0.048 | 378.55 | 6.864 |
| 30 | 21.29 | 0.181 | 0.050 | 371.94 | 6.966 |
| 31 | 21.14 | 0.187 | 0.053 | 365.27 | 7.067 |
| 32 | 20.98 | 0.193 | 0.056 | 358.52 | 7.168 |
| 33 | 20.82 | 0.199 | 0.059 | 351.69 | 7.266 |
| 34 | 20.65 | 0.205 | 0.062 | 344.79 | 7.364 |
| 35 | 20.48 | 0.212 | 0.065 | 337.80 | 7.459 |
| 36 | 20.30 | 0.219 | 0.068 | 330.74 | 7.552 |
| 37 | 20.11 | 0.226 | 0.072 | 323.60 | 7.643 |
| 38 | 19.93 | 0.233 | 0.076 | 316.37 | 7.731 |
| 39 | 19.73 | 0.241 | 0.080 | 309.07 | 7.816 |
| 40 | 19.53 | 0.248 | 0.084 | 301.68 | 7.898 |
| 41 | 19.32 | 0.256 | 0.088 | 294.23 | 7.975 |
| 42 | 19.11 | 0.265 | 0.093 | 286.71 | 8.049 |
| 43 | 18.88 | 0.273 | 0.098 | 279.14 | 8.118 |
| 44 | 18.66 | 0.282 | 0.103 | 271.53 | 8.183 |
| 45 | 18.42 | 0.291 | 0.109 | 263.88 | 8.244 |
| 46 | 18.18 | 0.300 | 0.115 | 256.19 | 8.299 |
| 47 | 17.94 | 0.310 | 0.121 | 248.46 | 8.348 |
| 48 | 17.68 | 0.319 | 0.128 | 240.72 | 8.391 |
| 49 | 17.42 | 0.329 | 0.134 | 232.96 | 8.428 |

## Показатели таблиц смертности

| $x$ | $\ddot{a}_{[x]}$ | $A_{[x]}$ | ${}^{2}A_{[x]}$ | $(I\ddot{a})_{[x]}$ | $(IA)^{4\%}_{[x]}$ |
|---|---|---|---|---|---|
| 50 | 17.16 | 0.339 | 0.142 | 225.20 | 8.459 |
| 51 | 16.88 | 0.350 | 0.149 | 217.44 | 8.483 |
| 52 | 16.60 | 0.361 | 0.157 | 209.69 | 8.500 |
| 53 | 16.32 | 0.372 | 0.166 | 201.97 | 8.510 |
| 54 | 16.02 | 0.383 | 0.174 | 194.29 | 8.512 |
| 55 | 15.73 | 0.394 | 0.184 | 186.67 | 8.507 |
| 56 | 15.42 | 0.406 | 0.193 | 179.11 | 8.494 |
| 57 | 15.12 | 0.418 | 0.203 | 171.62 | 8.474 |
| 58 | 14.80 | 0.430 | 0.213 | 164.21 | 8.446 |
| 59 | 14.49 | 0.442 | 0.224 | 156.86 | 8.409 |
| 60 | 14.16 | 0.454 | 0.235 | 149.61 | 8.363 |
| 61 | 13.83 | 0.467 | 0.246 | 142.45 | 8.308 |
| 62 | 13.50 | 0.480 | 0.258 | 135.38 | 8.243 |
| 63 | 13.16 | 0.493 | 0.270 | 128.45 | 8.169 |
| 64 | 12.81 | 0.506 | 0.284 | 121.61 | 8.084 |
| 65 | 12.46 | 0.519 | 0.297 | 114.93 | 7.991 |
| 66 | 12.10 | 0.533 | 0.311 | 108.34 | 7.884 |
| 67 | 11.74 | 0.547 | 0.326 | 101.87 | 7.765 |
| 68 | 11.37 | 0.561 | 0.341 | 95.58 | 7.636 |
| 69 | 10.99 | 0.575 | 0.357 | 89.46 | 7.494 |
| 70 | 10.62 | 0.590 | 0.373 | 83.59 | 7.346 |
| 71 | 10.25 | 0.604 | 0.390 | 77.92 | 7.188 |
| 72 | 9.88 | 0.618 | 0.407 | 72.51 | 7.023 |
| 73 | 9.51 | 0.632 | 0.424 | 67.33 | 6.850 |
| 74 | 9.14 | 0.646 | 0.441 | 62.41 | 6.672 |
| 75 | 8.79 | 0.659 | 0.458 | 57.79 | 6.492 |
| 76 | 8.44 | 0.672 | 0.475 | 53.41 | 6.308 |
| 77 | 8.10 | 0.685 | 0.491 | 49.31 | 6.122 |
| 78 | 7.77 | 0.698 | 0.508 | 45.45 | 5.932 |
| 79 | 7.44 | 0.710 | 0.524 | 41.86 | 5.743 |
| 80 | 7.13 | 0.721 | 0.540 | 38.53 | 5.554 |
| 81 | 7.14 | 0.720 | 0.536 | 37.41 | 5.593 |
| 82 | 6.87 | 0.729 | 0.550 | 34.60 | 5.420 |
| 83 | 6.62 | 0.738 | 0.563 | 32.01 | 5.249 |
| 84 | 6.37 | 0.746 | 0.576 | 29.61 | 5.079 |
| 85 | 6.13 | 0.754 | 0.588 | 27.38 | 4.908 |
| 86 | 5.91 | 0.760 | 0.598 | 25.38 | 4.743 |
| 87 | 5.70 | 0.765 | 0.608 | 23.49 | 4.572 |
| 88 | 5.50 | 0.768 | 0.617 | 21.77 | 4.402 |
| 89 | 5.29 | 0.771 | 0.624 | 20.08 | 4.215 |
| 90 | 5.10 | 0.771 | 0.630 | 18.52 | 4.020 |
| 91 | 4.92 | 0.766 | 0.632 | 17.10 | 3.815 |
| 92 | 4.75 | 0.756 | 0.629 | 15.78 | 3.592 |
| 93 | 4.57 | 0.739 | 0.620 | 14.42 | 3.329 |
| 94 | 4.36 | 0.711 | 0.603 | 12.95 | 3.006 |
| 95 | 4.11 | 0.664 | 0.570 | 11.36 | 2.604 |
| 96 | 3.78 | 0.591 | 0.514 | 9.53 | 2.089 |
| 97 | 3.30 | 0.477 | 0.424 | 7.35 | 1.430 |
| 98 | 2.89 | 0.000 | 0.000 | 5.70 | 0.000 |
| 99 | 1.96 | 0.000 | 0.000 | 2.92 | 0.000 |
| 100 | 1.00 | 0.000 | 0.000 | 1.00 | 0.000 |

## Показатели таблиц смертности

*6%*

| $x$ | $\ddot{a}_x$ | $A_x$ | ${}^2A_x$ | $(I\ddot{a})_x$ | $(IA)_x$ |
|---|---|---|---|---|---|
| 0 | 17.13 | 0.030 | 0.012 | 283.63 | 1.072 |
| 1 | 17.23 | 0.025 | 0.006 | 284.69 | 1.113 |
| 2 | 17.25 | 0.023 | 0.004 | 284.35 | 1.157 |
| 3 | 17.24 | 0.024 | 0.004 | 283.27 | 1.202 |
| 4 | 17.22 | 0.025 | 0.004 | 282.09 | 1.249 |
| 5 | 17.20 | 0.027 | 0.004 | 280.84 | 1.297 |
| 6 | 17.17 | 0.028 | 0.004 | 279.53 | 1.347 |
| 7 | 17.15 | 0.029 | 0.004 | 278.17 | 1.398 |
| 8 | 17.12 | 0.031 | 0.005 | 276.75 | 1.451 |
| 9 | 17.09 | 0.033 | 0.005 | 275.26 | 1.506 |
| 10 | 17.06 | 0.034 | 0.005 | 273.72 | 1.562 |
| 11 | 17.02 | 0.036 | 0.006 | 272.12 | 1.619 |
| 12 | 16.99 | 0.038 | 0.006 | 270.45 | 1.678 |
| 13 | 16.95 | 0.040 | 0.007 | 268.73 | 1.739 |
| 14 | 16.91 | 0.043 | 0.008 | 266.95 | 1.801 |
| 15 | 16.87 | 0.045 | 0.008 | 265.13 | 1.864 |
| 16 | 16.83 | 0.047 | 0.009 | 263.25 | 1.929 |
| 17 | 16.79 | 0.050 | 0.010 | 261.32 | 1.996 |
| 18 | 16.75 | 0.052 | 0.010 | 259.33 | 2.064 |
| 19 | 16.70 | 0.055 | 0.011 | 257.28 | 2.134 |
| 20 | 16.65 | 0.057 | 0.012 | 255.17 | 2.205 |
| 21 | 16.60 | 0.060 | 0.013 | 252.97 | 2.278 |
| 22 | 16.55 | 0.063 | 0.014 | 250.71 | 2.353 |
| 23 | 16.49 | 0.066 | 0.015 | 248.38 | 2.428 |
| 24 | 16.43 | 0.070 | 0.016 | 245.98 | 2.505 |
| 25 | 16.37 | 0.073 | 0.017 | 243.52 | 2.584 |
| 26 | 16.31 | 0.077 | 0.018 | 240.99 | 2.663 |
| 27 | 16.24 | 0.081 | 0.019 | 238.39 | 2.745 |
| 28 | 16.18 | 0.084 | 0.021 | 235.74 | 2.827 |
| 29 | 16.11 | 0.088 | 0.022 | 233.03 | 2.911 |
| 30 | 16.04 | 0.092 | 0.023 | 230.27 | 2.996 |
| 31 | 15.96 | 0.096 | 0.025 | 227.44 | 3.083 |
| 32 | 15.89 | 0.101 | 0.026 | 224.55 | 3.171 |
| 33 | 15.81 | 0.105 | 0.027 | 221.59 | 3.261 |
| 34 | 15.73 | 0.110 | 0.029 | 218.54 | 3.352 |
| 35 | 15.64 | 0.114 | 0.030 | 215.42 | 3.444 |
| 36 | 15.56 | 0.119 | 0.032 | 212.22 | 3.537 |
| 37 | 15.46 | 0.125 | 0.034 | 208.93 | 3.631 |
| 38 | 15.37 | 0.130 | 0.036 | 205.55 | 3.725 |
| 39 | 15.27 | 0.136 | 0.038 | 202.08 | 3.820 |
| 40 | 15.16 | 0.142 | 0.040 | 198.52 | 3.915 |
| 41 | 15.05 | 0.148 | 0.043 | 194.86 | 4.010 |
| 42 | 14.93 | 0.155 | 0.046 | 191.12 | 4.105 |
| 43 | 14.81 | 0.162 | 0.049 | 187.29 | 4.199 |
| 44 | 14.68 | 0.169 | 0.052 | 183.38 | 4.293 |
| 45 | 14.55 | 0.176 | 0.055 | 179.40 | 4.386 |
| 46 | 14.41 | 0.184 | 0.059 | 175.33 | 4.477 |
| 47 | 14.27 | 0.192 | 0.063 | 171.18 | 4.567 |
| 48 | 14.12 | 0.201 | 0.067 | 166.96 | 4.655 |
| 49 | 13.96 | 0.209 | 0.071 | 162.67 | 4.741 |

## Показатели таблиц смертности

*6%*

| $x$ | $\ddot{a}_x$ | $A_x$ | ${}^2A_x$ | $(I\ddot{a})_x$ | $(IA)_x$ |
|---|---|---|---|---|---|
| 50 | 13.80 | 0.219 | 0.076 | 158.32 | 4.825 |
| 51 | 13.63 | 0.228 | 0.081 | 153.90 | 4.905 |
| 52 | 13.45 | 0.238 | 0.087 | 149.42 | 4.982 |
| 53 | 13.27 | 0.248 | 0.093 | 144.89 | 5.055 |
| 54 | 13.08 | 0.259 | 0.099 | 140.31 | 5.124 |
| 55 | 12.89 | 0.270 | 0.106 | 135.71 | 5.189 |
| 56 | 12.69 | 0.282 | 0.113 | 131.08 | 5.249 |
| 57 | 12.48 | 0.293 | 0.120 | 126.44 | 5.305 |
| 58 | 12.27 | 0.305 | 0.128 | 121.77 | 5.356 |
| 59 | 12.05 | 0.318 | 0.136 | 117.09 | 5.400 |
| 60 | 11.82 | 0.330 | 0.145 | 112.40 | 5.438 |
| 61 | 11.59 | 0.344 | 0.154 | 107.70 | 5.470 |
| 62 | 11.35 | 0.357 | 0.164 | 103.01 | 5.494 |
| 63 | 11.10 | 0.371 | 0.175 | 98.34 | 5.511 |
| 64 | 10.84 | 0.385 | 0.186 | 93.66 | 5.519 |
| 65 | 10.59 | 0.400 | 0.198 | 89.05 | 5.520 |
| 66 | 10.32 | 0.415 | 0.210 | 84.43 | 5.509 |
| 67 | 10.04 | 0.431 | 0.223 | 79.88 | 5.490 |
| 68 | 9.75 | 0.447 | 0.238 | 75.34 | 5.457 |
| 69 | 9.45 | 0.464 | 0.254 | 70.83 | 5.410 |
| 70 | 9.15 | 0.481 | 0.270 | 66.45 | 5.355 |
| 71 | 8.84 | 0.499 | 0.287 | 62.16 | 5.286 |
| 72 | 8.53 | 0.516 | 0.304 | 58.03 | 5.211 |
| 73 | 8.22 | 0.534 | 0.322 | 54.01 | 5.123 |
| 74 | 7.90 | 0.551 | 0.341 | 50.14 | 5.024 |
| 75 | 7.59 | 0.569 | 0.360 | 46.43 | 4.918 |
| 76 | 7.27 | 0.586 | 0.380 | 42.89 | 4.802 |
| 77 | 6.97 | 0.603 | 0.399 | 39.57 | 4.683 |
| 78 | 6.67 | 0.620 | 0.419 | 36.40 | 4.555 |
| 79 | 6.36 | 0.637 | 0.440 | 33.40 | 4.420 |
| 80 | 6.07 | 0.654 | 0.460 | 30.58 | 4.279 |
| 81 | 5.78 | 0.669 | 0.480 | 27.96 | 4.136 |
| 82 | 5.51 | 0.685 | 0.500 | 25.54 | 3.991 |
| 83 | 5.24 | 0.699 | 0.519 | 23.28 | 3.843 |
| 84 | 4.98 | 0.713 | 0.538 | 21.21 | 3.697 |
| 85 | 4.74 | 0.726 | 0.556 | 19.31 | 3.550 |
| 86 | 4.50 | 0.738 | 0.573 | 17.56 | 3.403 |
| 87 | 4.28 | 0.749 | 0.590 | 15.93 | 3.251 |
| 88 | 4.07 | 0.759 | 0.606 | 14.46 | 3.105 |
| 89 | 3.86 | 0.768 | 0.620 | 13.08 | 2.953 |
| 90 | 3.67 | 0.775 | 0.634 | 11.82 | 2.802 |
| 91 | 3.46 | 0.781 | 0.647 | 10.60 | 2.634 |
| 92 | 3.27 | 0.784 | 0.658 | 9.48 | 2.461 |
| 93 | 3.09 | 0.784 | 0.665 | 8.45 | 2.283 |
| 94 | 2.93 | 0.777 | 0.666 | 7.49 | 2.096 |
| 95 | 2.75 | 0.762 | 0.662 | 6.52 | 1.882 |
| 96 | 2.53 | 0.737 | 0.649 | 5.47 | 1.624 |
| 97 | 2.28 | 0.693 | 0.621 | 4.37 | 1.320 |
| 98 | 1.94 | 0.620 | 0.568 | 3.17 | 0.951 |
| 99 | 1.44 | 0.506 | 0.477 | 1.88 | 0.506 |
| 100 | 1.00 | 0.000 | 0.000 | 1.00 | 0.000 |

## Показатели таблиц смертности

*6%*

| $x$ | $\ddot{a}_{[x]}$ | $A_{[x]}$ | ${}^{2}A_{[x]}$ | $(I\ddot{a})_{[x]}$ | $(IA)_{[x]}$ |
|---|---|---|---|---|---|
| 0 | 17.16 | 0.029 | 0.010 | 284.16 | 1.072 |
| 1 | 17.24 | 0.024 | 0.005 | 284.88 | 1.113 |
| 2 | 17.26 | 0.023 | 0.004 | 284.39 | 1.157 |
| 3 | 17.24 | 0.024 | 0.003 | 283.29 | 1.202 |
| 4 | 17.22 | 0.025 | 0.004 | 282.11 | 1.249 |
| 5 | 17.20 | 0.027 | 0.004 | 280.86 | 1.297 |
| 6 | 17.17 | 0.028 | 0.004 | 279.55 | 1.347 |
| 7 | 17.15 | 0.029 | 0.004 | 278.19 | 1.398 |
| 8 | 17.12 | 0.031 | 0.005 | 276.76 | 1.451 |
| 9 | 17.09 | 0.033 | 0.005 | 275.28 | 1.506 |
| 10 | 17.06 | 0.034 | 0.005 | 273.74 | 1.562 |
| 11 | 17.03 | 0.036 | 0.006 | 272.13 | 1.619 |
| 12 | 16.99 | 0.038 | 0.006 | 270.47 | 1.678 |
| 13 | 16.95 | 0.040 | 0.007 | 268.75 | 1.739 |
| 14 | 16.92 | 0.042 | 0.008 | 266.98 | 1.801 |
| 15 | 16.88 | 0.045 | 0.008 | 265.16 | 1.864 |
| 16 | 16.84 | 0.047 | 0.009 | 263.28 | 1.929 |
| 17 | 16.79 | 0.049 | 0.009 | 261.36 | 1.996 |
| 18 | 16.75 | 0.052 | 0.010 | 259.38 | 2.064 |
| 19 | 16.70 | 0.054 | 0.011 | 257.33 | 2.134 |
| 20 | 16.66 | 0.057 | 0.012 | 255.22 | 2.206 |
| 21 | 16.61 | 0.060 | 0.012 | 253.04 | 2.279 |
| 22 | 16.55 | 0.063 | 0.013 | 250.78 | 2.353 |
| 23 | 16.50 | 0.066 | 0.014 | 248.46 | 2.429 |
| 24 | 16.44 | 0.069 | 0.015 | 246.07 | 2.506 |
| 25 | 16.38 | 0.073 | 0.016 | 243.62 | 2.584 |
| 26 | 16.32 | 0.076 | 0.018 | 241.10 | 2.664 |
| 27 | 16.25 | 0.080 | 0.019 | 238.52 | 2.745 |
| 28 | 16.19 | 0.084 | 0.020 | 235.89 | 2.828 |
| 29 | 16.12 | 0.088 | 0.021 | 233.19 | 2.912 |
| 30 | 16.05 | 0.092 | 0.023 | 230.44 | 2.998 |
| 31 | 15.97 | 0.096 | 0.024 | 227.62 | 3.085 |
| 32 | 15.90 | 0.100 | 0.025 | 224.74 | 3.173 |
| 33 | 15.82 | 0.104 | 0.027 | 221.78 | 3.263 |
| 34 | 15.74 | 0.109 | 0.028 | 218.74 | 3.354 |
| 35 | 15.66 | 0.114 | 0.030 | 215.63 | 3.446 |
| 36 | 15.57 | 0.119 | 0.031 | 212.43 | 3.539 |
| 37 | 15.48 | 0.124 | 0.033 | 209.15 | 3.633 |
| 38 | 15.38 | 0.129 | 0.035 | 205.77 | 3.728 |
| 39 | 15.28 | 0.135 | 0.037 | 202.31 | 3.823 |
| 40 | 15.18 | 0.141 | 0.039 | 198.76 | 3.918 |
| 41 | 15.07 | 0.147 | 0.042 | 195.12 | 4.014 |
| 42 | 14.95 | 0.154 | 0.044 | 191.39 | 4.109 |
| 43 | 14.83 | 0.160 | 0.047 | 187.59 | 4.204 |
| 44 | 14.71 | 0.167 | 0.050 | 183.70 | 4.298 |
| 45 | 14.58 | 0.175 | 0.053 | 179.74 | 4.392 |
| 46 | 14.44 | 0.182 | 0.057 | 175.70 | 4.484 |
| 47 | 14.30 | 0.190 | 0.061 | 171.58 | 4.575 |
| 48 | 14.15 | 0.199 | 0.065 | 167.40 | 4.664 |
| 49 | 14.00 | 0.207 | 0.069 | 163.14 | 4.751 |

## Показатели таблиц смертности

*6%*

| $x$ | $\ddot{a}_{[x]}$ | $A_{[x]}$ | ${}^{2}A_{[x]}$ | $(I\ddot{a})_{[x]}$ | $(IA)_{[x]}$ |
|---|---|---|---|---|---|
| 50 | 13.84 | 0.216 | 0.073 | 158.83 | 4.836 |
| 51 | 13.67 | 0.226 | 0.078 | 154.44 | 4.918 |
| 52 | 13.50 | 0.235 | 0.084 | 150.01 | 4.996 |
| 53 | 13.32 | 0.245 | 0.089 | 145.53 | 5.071 |
| 54 | 13.14 | 0.256 | 0.095 | 141.01 | 5.143 |
| 55 | 12.95 | 0.266 | 0.101 | 136.48 | 5.211 |
| 56 | 12.76 | 0.277 | 0.108 | 131.91 | 5.274 |
| 57 | 12.56 | 0.289 | 0.115 | 127.33 | 5.334 |
| 58 | 12.35 | 0.300 | 0.122 | 122.73 | 5.388 |
| 59 | 12.14 | 0.312 | 0.130 | 118.11 | 5.436 |
| 60 | 11.92 | 0.325 | 0.138 | 113.49 | 5.479 |
| 61 | 11.70 | 0.337 | 0.147 | 108.87 | 5.516 |
| 62 | 11.47 | 0.350 | 0.156 | 104.24 | 5.545 |
| 63 | 11.23 | 0.364 | 0.166 | 99.65 | 5.568 |
| 64 | 10.99 | 0.377 | 0.176 | 95.05 | 5.582 |
| 65 | 10.74 | 0.391 | 0.187 | 90.50 | 5.590 |
| 66 | 10.48 | 0.406 | 0.199 | 85.95 | 5.586 |
| 67 | 10.21 | 0.421 | 0.211 | 81.43 | 5.573 |
| 68 | 9.94 | 0.437 | 0.224 | 76.97 | 5.549 |
| 69 | 9.65 | 0.453 | 0.239 | 72.57 | 5.513 |
| 70 | 9.37 | 0.469 | 0.253 | 68.31 | 5.470 |
| 71 | 9.08 | 0.485 | 0.268 | 64.14 | 5.417 |
| 72 | 8.79 | 0.501 | 0.284 | 60.11 | 5.355 |
| 73 | 8.51 | 0.517 | 0.300 | 56.22 | 5.284 |
| 74 | 8.22 | 0.533 | 0.317 | 52.48 | 5.204 |
| 75 | 7.93 | 0.549 | 0.333 | 48.93 | 5.119 |
| 76 | 7.65 | 0.565 | 0.350 | 45.54 | 5.027 |
| 77 | 7.38 | 0.580 | 0.367 | 42.32 | 4.929 |
| 78 | 7.10 | 0.596 | 0.384 | 39.27 | 4.824 |
| 79 | 6.84 | 0.610 | 0.401 | 36.41 | 4.715 |
| 80 | 6.58 | 0.625 | 0.418 | 33.73 | 4.603 |
| 81 | 6.60 | 0.622 | 0.411 | 32.93 | 4.665 |
| 82 | 6.38 | 0.634 | 0.426 | 30.64 | 4.559 |
| 83 | 6.16 | 0.646 | 0.440 | 28.51 | 4.452 |
| 84 | 5.95 | 0.657 | 0.454 | 26.53 | 4.342 |
| 85 | 5.75 | 0.667 | 0.467 | 24.67 | 4.227 |
| 86 | 5.56 | 0.675 | 0.480 | 22.99 | 4.115 |
| 87 | 5.38 | 0.683 | 0.491 | 21.40 | 3.995 |
| 88 | 5.21 | 0.690 | 0.502 | 19.94 | 3.873 |
| 89 | 5.03 | 0.695 | 0.512 | 18.48 | 3.735 |
| 90 | 4.85 | 0.698 | 0.521 | 17.15 | 3.587 |
| 91 | 4.70 | 0.697 | 0.527 | 15.91 | 3.426 |
| 92 | 4.55 | 0.691 | 0.528 | 14.76 | 3.248 |
| 93 | 4.39 | 0.678 | 0.524 | 13.57 | 3.031 |
| 94 | 4.20 | 0.656 | 0.514 | 12.26 | 2.757 |
| 95 | 3.97 | 0.617 | 0.492 | 10.83 | 2.408 |
| 96 | 3.67 | 0.552 | 0.450 | 9.16 | 1.950 |
| 97 | 3.22 | 0.450 | 0.378 | 7.12 | 1.350 |
| 98 | 2.83 | 0.000 | 0.000 | 5.56 | 0.000 |
| 99 | 1.94 | 0.000 | 0.000 | 2.89 | 0.000 |
| 100 | 1.00 | 0.000 | 0.000 | 1.00 | 0.000 |

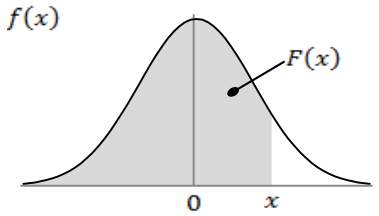
# Статистика

## Стандартное нормальное распределение

Функция распределения

Функция распределения обозначена $F(x)$, плотность вероятности обозначена $f(x)$.

$$F(x) = \int_{-\infty}^{x} f(t)\,dt = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-\frac{1}{2}t^2}\,dt$$




| $x$ | $F(x)$ | $x$ | $F(x)$ | $x$ | $F(x)$ | $x$ | $F(x)$ | $x$ | $F(x)$ |
|---|---|---|---|---|---|---|---|---|---|
| **0.00** | 0.500 00 | **0.40** | 0.655 42 | **0.80** | 0.788 14 | **1.20** | 0.884 93 | **1.60** | 0.945 20 |
| **0.01** | 0.503 99 | **0.41** | 0.659 10 | **0.81** | 0.791 03 | **1.21** | 0.886 86 | **1.61** | 0.946 30 |
| **0.02** | 0.507 98 | **0.42** | 0.662 76 | **0.82** | 0.793 89 | **1.22** | 0.888 77 | **1.62** | 0.947 38 |
| **0.03** | 0.511 97 | **0.43** | 0.666 40 | **0.83** | 0.796 73 | **1.23** | 0.890 65 | **1.63** | 0.948 45 |
| **0.04** | 0.515 95 | **0.44** | 0.670 03 | **0.84** | 0.799 55 | **1.24** | 0.892 51 | **1.64** | 0.949 50 |
| **0.05** | 0.519 94 | **0.45** | 0.673 64 | **0.85** | 0.802 34 | **1.25** | 0.894 35 | **1.65** | 0.950 53 |
| **0.06** | 0.523 92 | **0.46** | 0.677 24 | **0.86** | 0.805 11 | **1.26** | 0.896 17 | **1.66** | 0.951 54 |
| **0.07** | 0.527 90 | **0.47** | 0.680 82 | **0.87** | 0.807 85 | **1.27** | 0.897 96 | **1.67** | 0.952 54 |
| **0.08** | 0.531 88 | **0.48** | 0.684 39 | **0.88** | 0.810 57 | **1.28** | 0.899 73 | **1.68** | 0.953 52 |
| **0.09** | 0.535 86 | **0.49** | 0.687 93 | **0.89** | 0.813 27 | **1.29** | 0.901 47 | **1.69** | 0.954 49 |
| **0.10** | 0.539 83 | **0.50** | 0.691 46 | **0.90** | 0.815 94 | **1.30** | 0.903 20 | **1.70** | 0.955 43 |
| **0.11** | 0.543 80 | **0.51** | 0.694 97 | **0.91** | 0.818 59 | **1.31** | 0.904 90 | **1.71** | 0.956 37 |
| **0.12** | 0.547 76 | **0.52** | 0.698 47 | **0.92** | 0.821 21 | **1.32** | 0.906 58 | **1.72** | 0.957 28 |
| **0.13** | 0.551 72 | **0.53** | 0.701 94 | **0.93** | 0.823 81 | **1.33** | 0.908 24 | **1.73** | 0.958 18 |
| **0.14** | 0.555 67 | **0.54** | 0.705 40 | **0.94** | 0.826 39 | **1.34** | 0.909 88 | **1.74** | 0.959 07 |
| **0.15** | 0.559 62 | **0.55** | 0.708 84 | **0.95** | 0.828 94 | **1.35** | 0.911 49 | **1.75** | 0.959 94 |
| **0.16** | 0.563 56 | **0.56** | 0.712 26 | **0.96** | 0.831 47 | **1.36** | 0.913 09 | **1.76** | 0.960 80 |
| **0.17** | 0.567 49 | **0.57** | 0.715 66 | **0.97** | 0.833 98 | **1.37** | 0.914 66 | **1.77** | 0.961 64 |
| **0.18** | 0.571 42 | **0.58** | 0.719 04 | **0.98** | 0.836 46 | **1.38** | 0.916 21 | **1.78** | 0.962 46 |
| **0.19** | 0.575 35 | **0.59** | 0.722 40 | **0.99** | 0.838 91 | **1.39** | 0.917 74 | **1.79** | 0.963 27 |
| **0.20** | 0.579 26 | **0.60** | 0.725 75 | **1.00** | 0.841 34 | **1.40** | 0.919 24 | **1.80** | 0.964 07 |
| **0.21** | 0.583 17 | **0.61** | 0.729 07 | **1.01** | 0.843 75 | **1.41** | 0.920 73 | **1.81** | 0.964 85 |
| **0.22** | 0.587 06 | **0.62** | 0.732 37 | **1.02** | 0.846 14 | **1.42** | 0.922 20 | **1.82** | 0.965 62 |
| **0.23** | 0.590 95 | **0.63** | 0.735 65 | **1.03** | 0.848 49 | **1.43** | 0.923 64 | **1.83** | 0.966 38 |
| **0.24** | 0.594 83 | **0.64** | 0.738 91 | **1.04** | 0.850 83 | **1.44** | 0.925 07 | **1.84** | 0.967 12 |
| **0.25** | 0.598 71 | **0.65** | 0.742 15 | **1.05** | 0.853 14 | **1.45** | 0.926 47 | **1.85** | 0.967 84 |
| **0.26** | 0.602 57 | **0.66** | 0.745 37 | **1.06** | 0.855 43 | **1.46** | 0.927 85 | **1.86** | 0.968 56 |
| **0.27** | 0.606 42 | **0.67** | 0.748 57 | **1.07** | 0.857 69 | **1.47** | 0.929 22 | **1.87** | 0.969 26 |
| **0.28** | 0.610 26 | **0.68** | 0.751 75 | **1.08** | 0.859 93 | **1.48** | 0.930 56 | **1.88** | 0.969 95 |
| **0.29** | 0.614 09 | **0.69** | 0.754 90 | **1.09** | 0.862 14 | **1.49** | 0.931 89 | **1.89** | 0.970 62 |
| **0.30** | 0.617 91 | **0.70** | 0.758 04 | **1.10** | 0.864 33 | **1.50** | 0.933 19 | **1.90** | 0.971 28 |
| **0.31** | 0.621 72 | **0.71** | 0.761 15 | **1.11** | 0.866 50 | **1.51** | 0.934 48 | **1.91** | 0.971 93 |
| **0.32** | 0.625 52 | **0.72** | 0.764 24 | **1.12** | 0.868 64 | **1.52** | 0.935 74 | **1.92** | 0.972 57 |
| **0.33** | 0.629 30 | **0.73** | 0.767 30 | **1.13** | 0.870 76 | **1.53** | 0.936 99 | **1.93** | 0.973 20 |
| **0.34** | 0.633 07 | **0.74** | 0.770 35 | **1.14** | 0.872 86 | **1.54** | 0.938 22 | **1.94** | 0.973 81 |
| **0.35** | 0.636 83 | **0.75** | 0.773 37 | **1.15** | 0.874 93 | **1.55** | 0.939 43 | **1.95** | 0.974 41 |
| **0.36** | 0.640 58 | **0.76** | 0.776 37 | **1.16** | 0.876 98 | **1.56** | 0.940 62 | **1.96** | 0.975 00 |
| **0.37** | 0.644 31 | **0.77** | 0.779 35 | **1.17** | 0.879 00 | **1.57** | 0.941 79 | **1.97** | 0.975 58 |
| **0.38** | 0.648 03 | **0.78** | 0.782 30 | **1.18** | 0.881 00 | **1.58** | 0.942 95 | **1.98** | 0.976 15 |
| **0.39** | 0.651 73 | **0.79** | 0.785 24 | **1.19** | 0.882 98 | **1.59** | 0.944 08 | **1.99** | 0.976 70 |
| **0.40** | 0.655 42 | **0.80** | 0.788 14 | **1.20** | 0.884 93 | **1.60** | 0.945 20 | **2.00** | 0.977 25 |

**Стандартное нормальное распределение**

Функция распределения (продолжение)

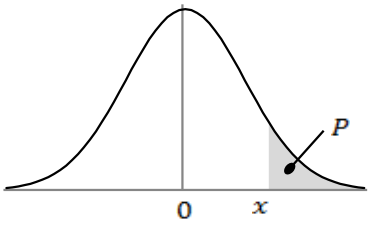
| $x$ | $F(x)$ | $x$ | $F(x)$ | $x$ | $F(x)$ | $x$ | $F(x)$ | $x$ | $F(x)$ | $x$ | $F(x)$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **2.00** | 0.977 25 | **2.40** | 0.991 80 | **2.80** | 0.997 44 | **3.20** | 0.999 31 | **3.60** | 0.999 84 | **4.00** | 0.999 97 |
| **2.01** | 0.977 78 | **2.41** | 0.992 02 | **2.81** | 0.997 52 | **3.21** | 0.999 34 | **3.61** | 0.999 85 | **4.01** | 0.999 97 |
| **2.02** | 0.978 31 | **2.42** | 0.992 24 | **2.82** | 0.997 60 | **3.22** | 0.999 36 | **3.62** | 0.999 85 | **4.02** | 0.999 97 |
| **2.03** | 0.978 82 | **2.43** | 0.992 45 | **2.83** | 0.997 67 | **3.23** | 0.999 38 | **3.63** | 0.999 86 | **4.03** | 0.999 97 |
| **2.04** | 0.979 32 | **2.44** | 0.992 66 | **2.84** | 0.997 74 | **3.24** | 0.999 40 | **3.64** | 0.999 86 | **4.04** | 0.999 97 |
| **2.05** | 0.979 82 | **2.45** | 0.992 86 | **2.85** | 0.997 81 | **3.25** | 0.999 42 | **3.65** | 0.999 87 | **4.05** | 0.999 97 |
| **2.06** | 0.980 30 | **2.46** | 0.993 05 | **2.86** | 0.997 88 | **3.26** | 0.999 44 | **3.66** | 0.999 87 | **4.06** | 0.999 98 |
| **2.07** | 0.980 77 | **2.47** | 0.993 24 | **2.87** | 0.997 95 | **3.27** | 0.999 46 | **3.67** | 0.999 88 | **4.07** | 0.999 98 |
| **2.08** | 0.981 24 | **2.48** | 0.993 43 | **2.88** | 0.998 01 | **3.28** | 0.999 48 | **3.68** | 0.999 88 | **4.08** | 0.999 98 |
| **2.09** | 0.981 69 | **2.49** | 0.993 61 | **2.89** | 0.998 07 | **3.29** | 0.999 50 | **3.69** | 0.999 89 | **4.09** | 0.999 98 |
| **2.10** | 0.982 14 | **2.50** | 0.993 79 | **2.90** | 0.998 13 | **3.30** | 0.999 52 | **3.70** | 0.999 89 | **4.10** | 0.999 98 |
| **2.11** | 0.982 57 | **2.51** | 0.993 96 | **2.91** | 0.998 19 | **3.31** | 0.999 53 | **3.71** | 0.999 90 | **4.11** | 0.999 98 |
| **2.12** | 0.983 00 | **2.52** | 0.994 13 | **2.92** | 0.998 25 | **3.32** | 0.999 55 | **3.72** | 0.999 90 | **4.12** | 0.999 98 |
| **2.13** | 0.983 41 | **2.53** | 0.994 30 | **2.93** | 0.998 31 | **3.33** | 0.999 57 | **3.73** | 0.999 90 | **4.13** | 0.999 98 |
| **2.14** | 0.983 82 | **2.54** | 0.994 46 | **2.94** | 0.998 36 | **3.34** | 0.999 58 | **3.74** | 0.999 91 | **4.14** | 0.999 98 |
| **2.15** | 0.984 22 | **2.55** | 0.994 61 | **2.95** | 0.998 41 | **3.35** | 0.999 60 | **3.75** | 0.999 91 | **4.15** | 0.999 98 |
| **2.16** | 0.984 61 | **2.56** | 0.994 77 | **2.96** | 0.998 46 | **3.36** | 0.999 61 | **3.76** | 0.999 92 | **4.16** | 0.999 98 |
| **2.17** | 0.985 00 | **2.57** | 0.994 92 | **2.97** | 0.998 51 | **3.37** | 0.999 62 | **3.77** | 0.999 92 | **4.17** | 0.999 98 |
| **2.18** | 0.985 37 | **2.58** | 0.995 06 | **2.98** | 0.998 56 | **3.38** | 0.999 64 | **3.78** | 0.999 92 | **4.18** | 0.999 99 |
| **2.19** | 0.985 74 | **2.59** | 0.995 20 | **2.99** | 0.998 61 | **3.39** | 0.999 65 | **3.79** | 0.999 92 | **4.19** | 0.999 99 |
| **2.20** | 0.986 10 | **2.60** | 0.995 34 | **3.00** | 0.998 65 | **3.40** | 0.999 66 | **3.80** | 0.999 93 | **4.20** | 0.999 99 |
| **2.21** | 0.986 45 | **2.61** | 0.995 47 | **3.01** | 0.998 69 | **3.41** | 0.999 68 | **3.81** | 0.999 93 | **4.21** | 0.999 99 |
| **2.22** | 0.986 79 | **2.62** | 0.995 60 | **3.02** | 0.998 74 | **3.42** | 0.999 69 | **3.82** | 0.999 93 | **4.22** | 0.999 99 |
| **2.23** | 0.987 13 | **2.63** | 0.995 73 | **3.03** | 0.998 78 | **3.43** | 0.999 70 | **3.83** | 0.999 94 | **4.23** | 0.999 99 |
| **2.24** | 0.987 45 | **2.64** | 0.995 85 | **3.04** | 0.998 82 | **3.44** | 0.999 71 | **3.84** | 0.999 94 | **4.24** | 0.999 99 |
| **2.25** | 0.987 78 | **2.65** | 0.995 98 | **3.05** | 0.998 86 | **3.45** | 0.999 72 | **3.85** | 0.999 94 | **4.25** | 0.999 99 |
| **2.26** | 0.988 09 | **2.66** | 0.996 09 | **3.06** | 0.998 89 | **3.46** | 0.999 73 | **3.86** | 0.999 94 | **4.26** | 0.999 99 |
| **2.27** | 0.988 40 | **2.67** | 0.996 21 | **3.07** | 0.998 93 | **3.47** | 0.999 74 | **3.87** | 0.999 95 | **4.27** | 0.999 99 |
| **2.28** | 0.988 70 | **2.68** | 0.996 32 | **3.08** | 0.998 96 | **3.48** | 0.999 75 | **3.88** | 0.999 95 | **4.28** | 0.999 99 |
| **2.29** | 0.988 99 | **2.69** | 0.996 43 | **3.09** | 0.999 00 | **3.49** | 0.999 76 | **3.89** | 0.999 95 | **4.29** | 0.999 99 |
| **2.30** | 0.989 28 | **2.70** | 0.996 53 | **3.10** | 0.999 03 | **3.50** | 0.999 77 | **3.90** | 0.999 95 | **4.30** | 0.999 99 |
| **2.31** | 0.989 56 | **2.71** | 0.996 64 | **3.11** | 0.999 06 | **3.51** | 0.999 78 | **3.91** | 0.999 95 | **4.31** | 0.999 99 |
| **2.32** | 0.989 83 | **2.72** | 0.996 74 | **3.12** | 0.999 10 | **3.52** | 0.999 78 | **3.92** | 0.999 96 | **4.32** | 0.999 99 |
| **2.33** | 0.990 10 | **2.73** | 0.996 83 | **3.13** | 0.999 13 | **3.53** | 0.999 79 | **3.93** | 0.999 96 | **4.33** | 0.999 99 |
| **2.34** | 0.990 36 | **2.74** | 0.996 93 | **3.14** | 0.999 16 | **3.54** | 0.999 80 | **3.94** | 0.999 96 | **4.34** | 0.999 99 |
| **2.35** | 0.990 61 | **2.75** | 0.997 02 | **3.15** | 0.999 18 | **3.55** | 0.999 81 | **3.95** | 0.999 96 | **4.35** | 0.999 99 |
| **2.36** | 0.990 86 | **2.76** | 0.997 11 | **3.16** | 0.999 21 | **3.56** | 0.999 81 | **3.96** | 0.999 96 | **4.36** | 0.999 99 |
| **2.37** | 0.991 11 | **2.77** | 0.997 20 | **3.17** | 0.999 24 | **3.57** | 0.999 82 | **3.97** | 0.999 96 | **4.37** | 0.999 99 |
| **2.38** | 0.991 34 | **2.78** | 0.997 28 | **3.18** | 0.999 26 | **3.58** | 0.999 83 | **3.98** | 0.999 97 | **4.38** | 0.999 99 |
| **2.39** | 0.991 58 | **2.79** | 0.997 36 | **3.19** | 0.999 29 | **3.59** | 0.999 83 | **3.99** | 0.999 97 | **4.39** | 0.999 99 |
| **2.40** | 0.991 80 | **2.80** | 0.997 44 | **3.20** | 0.999 31 | **3.60** | 0.999 84 | **4.00** | 0.999 97 | **4.40** | 0.999 99 |

## Стандартное нормальное распределение

Процентные точки

В таблице представлены значения $x$, определенные из уравнения:

$$P = \frac{1}{\sqrt{2\pi}} \int_{x}^{\infty} e^{-\frac{1}{2}t^2}\, dt$$

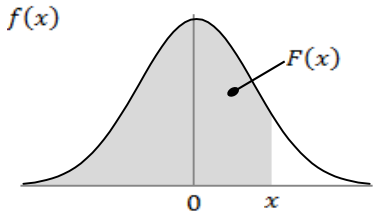



| P | x | P | x | P | x | P | x | P | x | P | x |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **50%** | 0.000 0 | **5.0%** | 1.644 9 | **3.0%** | 1.880 8 | **2.0%** | 2.053 7 | **1.0%** | 2.326 3 | **0.10%** | 3.090 2 |
| **45%** | 0.125 7 | **4.8%** | 1.664 6 | **2.9%** | 1.895 7 | **1.9%** | 2.074 9 | **0.9%** | 2.365 6 | **0.09%** | 3.121 4 |
| **40%** | 0.253 3 | **4.6%** | 1.684 9 | **2.8%** | 1.911 0 | **1.8%** | 2.096 9 | **0.8%** | 2.408 9 | **0.08%** | 3.155 9 |
| **35%** | 0.385 3 | **4.4%** | 1.706 0 | **2.7%** | 1.926 8 | **1.7%** | 2.120 1 | **0.7%** | 2.457 3 | **0.07%** | 3.194 7 |
| **30%** | 0.524 4 | **4.2%** | 1.727 9 | **2.6%** | 1.943 1 | **1.6%** | 2.144 4 | **0.6%** | 2.512 1 | **0.06%** | 3.238 9 |
| **25%** | 0.674 5 | **4.0%** | 1.750 7 | **2.5%** | 1.960 0 | **1.5%** | 2.170 1 | **0.5%** | 2.575 8 | **0.05%** | 3.290 5 |
| **20%** | 0.841 6 | **3.8%** | 1.774 4 | **2.4%** | 1.977 4 | **1.4%** | 2.197 3 | **0.4%** | 2.652 1 | **0.01%** | 3.719 0 |
| **15%** | 1.036 4 | **3.6%** | 1.799 1 | **2.3%** | 1.995 4 | **1.3%** | 2.226 2 | **0.3%** | 2.747 8 | **0.005%** | 3.890 6 |
| **10%** | 1.281 6 | **3.4%** | 1.825 0 | **2.2%** | 2.014 1 | **1.2%** | 2.257 1 | **0.2%** | 2.878 2 | **0.001%** | 4.264 9 |
| **5%** | 1.644 9 | **3.2%** | 1.852 2 | **2.1%** | 2.033 5 | **1.1%** | 2.290 4 | **0.1%** | 3.090 2 | **0.0005%** | 4.417 2 |

## Стандартное нормальное распределение

Плотность распределения

Функция распределения обозначена $F(x)$, плотность вероятности обозначена $f(x)$.




| $x$ | $f(x)$ | $x$ | $f(x)$ | $x$ | $f(x)$ | $x$ | $f(x)$ | $x$ | $f(x)$ |
|---|---|---|---|---|---|---|---|---|---|
| **0.00** | 0.398 94 | **0.40** | 0.368 27 | **0.80** | 0.289 69 | **1.20** | 0.194 19 | **1.60** | 0.110 92 |
| **0.01** | 0.398 92 | **0.41** | 0.366 78 | **0.81** | 0.287 37 | **1.21** | 0.191 86 | **1.61** | 0.109 16 |
| **0.02** | 0.398 86 | **0.42** | 0.365 26 | **0.82** | 0.285 04 | **1.22** | 0.189 54 | **1.62** | 0.107 41 |
| **0.03** | 0.398 76 | **0.43** | 0.363 71 | **0.83** | 0.282 69 | **1.23** | 0.187 24 | **1.63** | 0.105 68 |
| **0.04** | 0.398 62 | **0.44** | 0.362 14 | **0.84** | 0.280 34 | **1.24** | 0.184 94 | **1.64** | 0.103 96 |
| **0.05** | 0.398 44 | **0.45** | 0.360 53 | **0.85** | 0.277 99 | **1.25** | 0.182 65 | **1.65** | 0.102 27 |
| **0.06** | 0.398 23 | **0.46** | 0.358 89 | **0.86** | 0.275 62 | **1.26** | 0.180 37 | **1.66** | 0.100 59 |
| **0.07** | 0.397 97 | **0.47** | 0.357 23 | **0.87** | 0.273 24 | **1.27** | 0.178 10 | **1.67** | 0.098 93 |
| **0.08** | 0.397 67 | **0.48** | 0.355 53 | **0.88** | 0.270 86 | **1.28** | 0.175 85 | **1.68** | 0.097 28 |
| **0.09** | 0.397 33 | **0.49** | 0.353 81 | **0.89** | 0.268 48 | **1.29** | 0.173 60 | **1.69** | 0.095 66 |
| **0.10** | 0.396 95 | **0.50** | 0.352 07 | **0.90** | 0.266 09 | **1.30** | 0.171 37 | **1.70** | 0.094 05 |
| **0.11** | 0.396 54 | **0.51** | 0.350 29 | **0.91** | 0.263 69 | **1.31** | 0.169 15 | **1.71** | 0.092 46 |
| **0.12** | 0.396 08 | **0.52** | 0.348 49 | **0.92** | 0.261 29 | **1.32** | 0.166 94 | **1.72** | 0.090 89 |
| **0.13** | 0.395 59 | **0.53** | 0.346 67 | **0.93** | 0.258 88 | **1.33** | 0.164 74 | **1.73** | 0.089 33 |
| **0.14** | 0.395 05 | **0.54** | 0.344 82 | **0.94** | 0.256 47 | **1.34** | 0.162 56 | **1.74** | 0.087 80 |
| **0.15** | 0.394 48 | **0.55** | 0.342 94 | **0.95** | 0.254 06 | **1.35** | 0.160 38 | **1.75** | 0.086 28 |
| **0.16** | 0.393 87 | **0.56** | 0.341 05 | **0.96** | 0.251 64 | **1.36** | 0.158 23 | **1.76** | 0.084 78 |
| **0.17** | 0.393 22 | **0.57** | 0.339 12 | **0.97** | 0.249 23 | **1.37** | 0.156 08 | **1.77** | 0.083 29 |
| **0.18** | 0.392 53 | **0.58** | 0.337 18 | **0.98** | 0.246 81 | **1.38** | 0.153 95 | **1.78** | 0.081 83 |
| **0.19** | 0.391 81 | **0.59** | 0.335 21 | **0.99** | 0.244 39 | **1.39** | 0.151 83 | **1.79** | 0.080 38 |
| **0.20** | 0.391 04 | **0.60** | 0.333 23 | **1.00** | 0.241 97 | **1.40** | 0.149 73 | **1.80** | 0.078 95 |
| **0.21** | 0.390 24 | **0.61** | 0.331 22 | **1.01** | 0.239 55 | **1.41** | 0.147 64 | **1.81** | 0.077 54 |
| **0.22** | 0.389 40 | **0.62** | 0.329 18 | **1.02** | 0.237 13 | **1.42** | 0.145 56 | **1.82** | 0.076 14 |
| **0.23** | 0.388 53 | **0.63** | 0.327 13 | **1.03** | 0.234 71 | **1.43** | 0.143 51 | **1.83** | 0.074 77 |
| **0.24** | 0.387 62 | **0.64** | 0.325 06 | **1.04** | 0.232 30 | **1.44** | 0.141 46 | **1.84** | 0.073 41 |
| **0.25** | 0.386 67 | **0.65** | 0.322 97 | **1.05** | 0.229 88 | **1.45** | 0.139 43 | **1.85** | 0.072 07 |
| **0.26** | 0.385 68 | **0.66** | 0.320 86 | **1.06** | 0.227 47 | **1.46** | 0.137 42 | **1.86** | 0.070 74 |
| **0.27** | 0.384 66 | **0.67** | 0.318 74 | **1.07** | 0.225 06 | **1.47** | 0.135 42 | **1.87** | 0.069 43 |
| **0.28** | 0.383 61 | **0.68** | 0.316 59 | **1.08** | 0.222 65 | **1.48** | 0.133 44 | **1.88** | 0.068 14 |
| **0.29** | 0.382 52 | **0.69** | 0.314 43 | **1.09** | 0.220 25 | **1.49** | 0.131 47 | **1.89** | 0.066 87 |
| **0.30** | 0.381 39 | **0.70** | 0.312 25 | **1.10** | 0.217 85 | **1.50** | 0.129 52 | **1.90** | 0.065 62 |
| **0.31** | 0.380 23 | **0.71** | 0.310 06 | **1.11** | 0.215 46 | **1.51** | 0.127 58 | **1.91** | 0.064 38 |
| **0.32** | 0.379 03 | **0.72** | 0.307 85 | **1.12** | 0.213 07 | **1.52** | 0.125 67 | **1.92** | 0.063 16 |
| **0.33** | 0.377 80 | **0.73** | 0.305 63 | **1.13** | 0.210 69 | **1.53** | 0.123 76 | **1.93** | 0.061 95 |
| **0.34** | 0.376 54 | **0.74** | 0.303 39 | **1.14** | 0.208 31 | **1.54** | 0.121 88 | **1.94** | 0.060 77 |
| **0.35** | 0.375 24 | **0.75** | 0.301 14 | **1.15** | 0.205 94 | **1.55** | 0.120 01 | **1.95** | 0.059 60 |
| **0.36** | 0.373 91 | **0.76** | 0.298 87 | **1.16** | 0.203 57 | **1.56** | 0.118 16 | **1.96** | 0.058 44 |
| **0.37** | 0.372 55 | **0.77** | 0.296 60 | **1.17** | 0.201 21 | **1.57** | 0.116 32 | **1.97** | 0.057 30 |
| **0.38** | 0.371 15 | **0.78** | 0.294 31 | **1.18** | 0.198 86 | **1.58** | 0.114 51 | **1.98** | 0.056 18 |
| **0.39** | 0.369 73 | **0.79** | 0.292 00 | **1.19** | 0.196 52 | **1.59** | 0.112 70 | **1.99** | 0.055 08 |
| **0.40** | 0.368 27 | **0.80** | 0.289 69 | **1.20** | 0.194 19 | **1.60** | 0.110 92 | **2.00** | 0.053 99 |

**Стандартное нормальное распределение**

Плотность распределения (продолжение)

| $x$ | $f(x)$ | $x$ | $f(x)$ | $x$ | $f(x)$ | $x$ | $f(x)$ | $x$ | $f(x)$ |
|---|---|---|---|---|---|---|---|---|---|
| **2.00** | 0.053 99 | **2.40** | 0.022 40 | **2.80** | 0.007 92 | **3.20** | 0.002 38 | **3.60** | 0.000 61 |
| **2.01** | 0.052 92 | **2.41** | 0.021 86 | **2.81** | 0.007 70 | **3.21** | 0.002 31 | **3.61** | 0.000 59 |
| **2.02** | 0.051 86 | **2.42** | 0.021 34 | **2.82** | 0.007 48 | **3.22** | 0.002 24 | **3.62** | 0.000 57 |
| **2.03** | 0.050 82 | **2.43** | 0.020 83 | **2.83** | 0.007 27 | **3.23** | 0.002 17 | **3.63** | 0.000 55 |
| **2.04** | 0.049 80 | **2.44** | 0.020 33 | **2.84** | 0.007 07 | **3.24** | 0.002 10 | **3.64** | 0.000 53 |
| **2.05** | 0.048 79 | **2.45** | 0.019 84 | **2.85** | 0.006 87 | **3.25** | 0.002 03 | **3.65** | 0.000 51 |
| **2.06** | 0.047 80 | **2.46** | 0.019 36 | **2.86** | 0.006 68 | **3.26** | 0.001 96 | **3.66** | 0.000 49 |
| **2.07** | 0.046 82 | **2.47** | 0.018 89 | **2.87** | 0.006 49 | **3.27** | 0.001 90 | **3.67** | 0.000 47 |
| **2.08** | 0.045 86 | **2.48** | 0.018 42 | **2.88** | 0.006 31 | **3.28** | 0.001 84 | **3.68** | 0.000 46 |
| **2.09** | 0.044 92 | **2.49** | 0.017 97 | **2.89** | 0.006 13 | **3.29** | 0.001 78 | **3.69** | 0.000 44 |
| **2.10** | 0.043 98 | **2.50** | 0.017 53 | **2.90** | 0.005 95 | **3.30** | 0.001 72 | **3.70** | 0.000 43 |
| **2.11** | 0.043 07 | **2.51** | 0.017 10 | **2.91** | 0.005 78 | **3.31** | 0.001 67 | **3.71** | 0.000 41 |
| **2.12** | 0.042 17 | **2.52** | 0.016 67 | **2.92** | 0.005 62 | **3.32** | 0.001 61 | **3.72** | 0.000 39 |
| **2.13** | 0.041 28 | **2.53** | 0.016 25 | **2.93** | 0.005 45 | **3.33** | 0.001 56 | **3.73** | 0.000 38 |
| **2.14** | 0.040 41 | **2.54** | 0.015 85 | **2.94** | 0.005 30 | **3.34** | 0.001 51 | **3.74** | 0.000 37 |
| **2.15** | 0.039 55 | **2.55** | 0.015 45 | **2.95** | 0.005 14 | **3.35** | 0.001 46 | **3.75** | 0.000 35 |
| **2.16** | 0.038 71 | **2.56** | 0.015 06 | **2.96** | 0.004 99 | **3.36** | 0.001 41 | **3.76** | 0.000 34 |
| **2.17** | 0.037 88 | **2.57** | 0.014 68 | **2.97** | 0.004 85 | **3.37** | 0.001 36 | **3.77** | 0.000 33 |
| **2.18** | 0.037 06 | **2.58** | 0.014 31 | **2.98** | 0.004 71 | **3.38** | 0.001 32 | **3.78** | 0.000 32 |
| **2.19** | 0.036 26 | **2.59** | 0.013 94 | **2.99** | 0.004 57 | **3.39** | 0.001 28 | **3.79** | 0.000 30 |
| **2.20** | 0.035 48 | **2.60** | 0.013 58 | **3.00** | 0.004 43 | **3.40** | 0.001 23 | **3.80** | 0.000 29 |
| **2.21** | 0.034 70 | **2.61** | 0.013 23 | **3.01** | 0.004 30 | **3.41** | 0.001 19 | **3.81** | 0.000 28 |
| **2.22** | 0.033 94 | **2.62** | 0.012 89 | **3.02** | 0.004 17 | **3.42** | 0.001 15 | **3.82** | 0.000 27 |
| **2.23** | 0.033 19 | **2.63** | 0.012 56 | **3.03** | 0.004 05 | **3.43** | 0.001 11 | **3.83** | 0.000 26 |
| **2.24** | 0.032 46 | **2.64** | 0.012 23 | **3.04** | 0.003 93 | **3.44** | 0.001 08 | **3.84** | 0.000 25 |
| **2.25** | 0.031 74 | **2.65** | 0.011 91 | **3.05** | 0.003 81 | **3.45** | 0.001 04 | **3.85** | 0.000 24 |
| **2.26** | 0.031 03 | **2.66** | 0.011 60 | **3.06** | 0.003 70 | **3.46** | 0.001 00 | **3.86** | 0.000 23 |
| **2.27** | 0.030 34 | **2.67** | 0.011 30 | **3.07** | 0.003 58 | **3.47** | 0.000 97 | **3.87** | 0.000 22 |
| **2.28** | 0.029 66 | **2.68** | 0.011 00 | **3.08** | 0.003 48 | **3.48** | 0.000 94 | **3.88** | 0.000 22 |
| **2.29** | 0.028 99 | **2.69** | 0.010 71 | **3.09** | 0.003 37 | **3.49** | 0.000 90 | **3.89** | 0.000 21 |
| **2.30** | 0.028 33 | **2.70** | 0.010 42 | **3.10** | 0.003 27 | **3.50** | 0.000 87 | **3.90** | 0.000 20 |
| **2.31** | 0.027 68 | **2.71** | 0.010 14 | **3.11** | 0.003 17 | **3.51** | 0.000 84 | **3.91** | 0.000 19 |
| **2.32** | 0.027 05 | **2.72** | 0.009 87 | **3.12** | 0.003 07 | **3.52** | 0.000 81 | **3.92** | 0.000 18 |
| **2.33** | 0.026 43 | **2.73** | 0.009 61 | **3.13** | 0.002 98 | **3.53** | 0.000 79 | **3.93** | 0.000 18 |
| **2.34** | 0.025 82 | **2.74** | 0.009 35 | **3.14** | 0.002 88 | **3.54** | 0.000 76 | **3.94** | 0.000 17 |
| **2.35** | 0.025 22 | **2.75** | 0.009 09 | **3.15** | 0.002 79 | **3.55** | 0.000 73 | **3.95** | 0.000 16 |
| **2.36** | 0.024 63 | **2.76** | 0.008 85 | **3.16** | 0.002 71 | **3.56** | 0.000 71 | **3.96** | 0.000 16 |
| **2.37** | 0.024 06 | **2.77** | 0.008 61 | **3.17** | 0.002 62 | **3.57** | 0.000 68 | **3.97** | 0.000 15 |
| **2.38** | 0.023 49 | **2.78** | 0.008 37 | **3.18** | 0.002 54 | **3.58** | 0.000 66 | **3.98** | 0.000 15 |
| **2.39** | 0.022 94 | **2.79** | 0.008 14 | **3.19** | 0.002 46 | **3.59** | 0.000 63 | **3.99** | 0.000 14 |
| **2.40** | 0.022 40 | **2.80** | 0.007 92 | **3.20** | 0.002 38 | **3.60** | 0.000 61 | **4.00** | 0.000 13 |

**Распределение Пуассона**

Функция распределения

$$F(x) = \mathbb{P}\{X \le x\} = \sum_{k=0}^{x} \mathbb{P}\{X = k\} = \sum_{k=0}^{x} \exp(-\lambda)\frac{\lambda^k}{k!}$$

| | λ | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $x$ | 9.5 | 10.0 | 10.5 | 11.0 | 11.5 | 12.0 | 12.5 | 13.0 | 13.5 | 14.0 | 14.5 | 15.0 | 15.5 |
| **0** | 0.000 10 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 |
| **1** | 0.000 80 | 0.000 50 | 0.000 30 | 0.000 20 | 0.000 10 | 0.000 10 | 0.000 10 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 |
| **2** | 0.004 20 | 0.002 80 | 0.001 80 | 0.001 20 | 0.000 80 | 0.000 50 | 0.000 30 | 0.000 20 | 0.000 10 | 0.000 10 | 0.000 10 | 0.000 00 | 0.000 00 |
| **3** | 0.014 90 | 0.010 30 | 0.007 10 | 0.004 90 | 0.003 40 | 0.002 30 | 0.001 60 | 0.001 10 | 0.000 70 | 0.000 50 | 0.000 30 | 0.000 20 | 0.000 10 |
| **4** | 0.040 30 | 0.029 30 | 0.021 10 | 0.015 10 | 0.010 70 | 0.007 60 | 0.005 30 | 0.003 70 | 0.002 60 | 0.001 80 | 0.001 20 | 0.000 90 | 0.000 60 |
| **5** | 0.088 50 | 0.067 10 | 0.050 40 | 0.037 50 | 0.027 70 | 0.020 30 | 0.014 80 | 0.010 70 | 0.007 70 | 0.005 50 | 0.003 90 | 0.002 80 | 0.002 00 |
| **6** | 0.164 90 | 0.130 10 | 0.101 60 | 0.078 60 | 0.060 30 | 0.045 80 | 0.034 60 | 0.025 90 | 0.019 30 | 0.014 20 | 0.010 50 | 0.007 60 | 0.005 50 |
| **7** | 0.268 70 | 0.220 20 | 0.178 50 | 0.143 20 | 0.113 70 | 0.089 50 | 0.069 80 | 0.054 00 | 0.041 50 | 0.031 60 | 0.023 90 | 0.018 00 | 0.013 50 |
| **8** | 0.391 80 | 0.332 80 | 0.279 40 | 0.232 00 | 0.190 60 | 0.155 00 | 0.124 90 | 0.099 80 | 0.079 00 | 0.062 10 | 0.048 40 | 0.037 40 | 0.028 80 |
| **9** | 0.521 80 | 0.457 90 | 0.397 10 | 0.340 50 | 0.288 80 | 0.242 40 | 0.201 40 | 0.165 80 | 0.135 30 | 0.109 40 | 0.087 80 | 0.069 90 | 0.055 20 |
| **10** | 0.645 30 | 0.583 00 | 0.520 70 | 0.459 90 | 0.401 70 | 0.347 20 | 0.297 10 | 0.251 70 | 0.211 20 | 0.175 70 | 0.144 90 | 0.118 50 | 0.096 10 |
| **11** | 0.752 00 | 0.696 80 | 0.638 70 | 0.579 30 | 0.519 80 | 0.461 60 | 0.405 80 | 0.353 20 | 0.304 50 | 0.260 00 | 0.220 10 | 0.184 80 | 0.153 80 |
| **12** | 0.836 40 | 0.791 60 | 0.742 00 | 0.688 70 | 0.632 90 | 0.576 00 | 0.519 00 | 0.463 10 | 0.409 30 | 0.358 50 | 0.311 10 | 0.267 60 | 0.228 30 |
| **13** | 0.898 10 | 0.864 50 | 0.825 30 | 0.781 30 | 0.733 00 | 0.681 50 | 0.627 80 | 0.573 00 | 0.518 20 | 0.464 40 | 0.412 50 | 0.363 20 | 0.317 10 |
| **14** | 0.940 00 | 0.916 50 | 0.887 90 | 0.854 00 | 0.815 30 | 0.772 00 | 0.725 00 | 0.675 10 | 0.623 30 | 0.570 40 | 0.517 60 | 0.465 70 | 0.415 40 |
| **15** | 0.966 50 | 0.951 30 | 0.931 70 | 0.907 40 | 0.878 30 | 0.844 40 | 0.806 00 | 0.763 60 | 0.717 80 | 0.669 40 | 0.619 20 | 0.568 10 | 0.517 00 |
| **16** | 0.982 30 | 0.973 00 | 0.960 40 | 0.944 10 | 0.923 60 | 0.898 70 | 0.869 30 | 0.835 50 | 0.797 50 | 0.755 90 | 0.711 20 | 0.664 10 | 0.615 40 |
| **17** | 0.991 10 | 0.985 70 | 0.978 10 | 0.967 80 | 0.954 20 | 0.937 00 | 0.915 80 | 0.890 50 | 0.860 90 | 0.827 20 | 0.789 70 | 0.748 90 | 0.705 20 |
| **18** | 0.995 70 | 0.992 80 | 0.988 50 | 0.982 30 | 0.973 80 | 0.962 60 | 0.948 10 | 0.930 20 | 0.908 40 | 0.882 60 | 0.853 00 | 0.819 50 | 0.782 50 |
| **19** | 0.998 00 | 0.996 50 | 0.994 20 | 0.990 70 | 0.985 70 | 0.978 70 | 0.969 40 | 0.957 30 | 0.942 10 | 0.923 50 | 0.901 20 | 0.875 20 | 0.845 50 |
| **20** | 0.999 10 | 0.998 40 | 0.997 20 | 0.995 30 | 0.992 50 | 0.988 40 | 0.982 70 | 0.975 00 | 0.964 90 | 0.952 10 | 0.936 20 | 0.917 00 | 0.894 40 |
| **21** | 0.999 60 | 0.999 30 | 0.998 70 | 0.997 70 | 0.996 20 | 0.993 90 | 0.990 60 | 0.985 90 | 0.979 60 | 0.971 20 | 0.960 40 | 0.946 90 | 0.930 40 |
| **22** | 0.999 90 | 0.999 70 | 0.999 40 | 0.999 00 | 0.998 20 | 0.997 00 | 0.995 10 | 0.992 40 | 0.988 50 | 0.983 30 | 0.976 30 | 0.967 30 | 0.955 80 |
| **23** | 0.999 90 | 0.999 90 | 0.999 80 | 0.999 50 | 0.999 20 | 0.998 50 | 0.997 50 | 0.996 00 | 0.993 80 | 0.990 70 | 0.986 30 | 0.980 50 | 0.973 00 |
| **24** | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 80 | 0.999 60 | 0.999 30 | 0.998 80 | 0.998 00 | 0.996 80 | 0.995 00 | 0.992 40 | 0.988 80 | 0.984 00 |
| **25** | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 80 | 0.999 70 | 0.999 40 | 0.999 00 | 0.998 40 | 0.997 40 | 0.995 90 | 0.993 80 | 0.990 90 |
| **26** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 90 | 0.999 70 | 0.999 50 | 0.999 20 | 0.998 70 | 0.997 90 | 0.996 70 | 0.995 00 |
| **27** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 90 | 0.999 80 | 0.999 60 | 0.999 40 | 0.998 90 | 0.998 30 | 0.997 30 |
| **28** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 80 | 0.999 70 | 0.999 50 | 0.999 10 | 0.998 60 |
| **29** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 90 | 0.999 80 | 0.999 60 | 0.999 30 |
| **30** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 90 | 0.999 80 | 0.999 70 |
| **31** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 80 |
| **32** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 |
| **33** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 |

**Распределение Пуассона**

Функция распределения (продолжение)

$$F(x) = \mathbb{P}\{X \le x\} = \sum_{k=0}^{x} \mathbb{P}\{X = k\} = \sum_{k=0}^{x} \exp(-\lambda)\frac{\lambda^k}{k!}$$

| | λ | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $x$ | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 30 | 35 | 40 |
| **2** | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 |
| **3** | 0.000 10 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 |
| **4** | 0.000 40 | 0.000 20 | 0.000 10 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 |
| **5** | 0.001 40 | 0.000 70 | 0.000 30 | 0.000 20 | 0.000 10 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 |
| **6** | 0.004 00 | 0.002 10 | 0.001 00 | 0.000 50 | 0.000 30 | 0.000 10 | 0.000 10 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 |
| **7** | 0.010 00 | 0.005 40 | 0.002 90 | 0.001 50 | 0.000 80 | 0.000 40 | 0.000 20 | 0.000 10 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 | 0.000 00 |
| **8** | 0.022 00 | 0.012 60 | 0.007 10 | 0.003 90 | 0.002 10 | 0.001 10 | 0.000 60 | 0.000 30 | 0.000 20 | 0.000 10 | 0.000 00 | 0.000 00 | 0.000 00 |
| **9** | 0.043 30 | 0.026 10 | 0.015 40 | 0.008 90 | 0.005 00 | 0.002 80 | 0.001 50 | 0.000 80 | 0.000 40 | 0.000 20 | 0.000 00 | 0.000 00 | 0.000 00 |
| **10** | 0.077 40 | 0.049 10 | 0.030 40 | 0.018 30 | 0.010 80 | 0.006 30 | 0.003 50 | 0.002 00 | 0.001 10 | 0.000 60 | 0.000 00 | 0.000 00 | 0.000 00 |
| **11** | 0.127 00 | 0.084 70 | 0.054 90 | 0.034 70 | 0.021 40 | 0.012 90 | 0.007 60 | 0.004 40 | 0.002 50 | 0.001 40 | 0.000 10 | 0.000 00 | 0.000 00 |
| **12** | 0.193 10 | 0.135 00 | 0.091 70 | 0.060 60 | 0.039 00 | 0.024 50 | 0.015 10 | 0.009 10 | 0.005 40 | 0.003 10 | 0.000 20 | 0.000 00 | 0.000 00 |
| **13** | 0.274 50 | 0.200 90 | 0.142 60 | 0.098 40 | 0.066 10 | 0.043 40 | 0.027 80 | 0.017 40 | 0.010 70 | 0.006 50 | 0.000 40 | 0.000 00 | 0.000 00 |
| **14** | 0.367 50 | 0.280 80 | 0.208 10 | 0.149 70 | 0.104 90 | 0.071 60 | 0.047 70 | 0.031 10 | 0.019 80 | 0.012 40 | 0.000 90 | 0.000 00 | 0.000 00 |
| **15** | 0.466 70 | 0.371 50 | 0.286 70 | 0.214 80 | 0.156 50 | 0.111 10 | 0.076 90 | 0.052 00 | 0.034 40 | 0.022 30 | 0.001 90 | 0.000 10 | 0.000 00 |
| **16** | 0.566 00 | 0.467 70 | 0.375 10 | 0.292 00 | 0.221 10 | 0.162 90 | 0.117 00 | 0.082 10 | 0.056 30 | 0.037 70 | 0.003 90 | 0.000 30 | 0.000 00 |
| **17** | 0.659 30 | 0.564 00 | 0.468 60 | 0.378 40 | 0.297 00 | 0.227 00 | 0.169 00 | 0.122 80 | 0.087 10 | 0.060 50 | 0.007 30 | 0.000 60 | 0.000 00 |
| **18** | 0.742 30 | 0.655 00 | 0.562 20 | 0.469 50 | 0.381 40 | 0.301 70 | 0.232 50 | 0.174 80 | 0.128 30 | 0.092 00 | 0.012 90 | 0.001 20 | 0.000 10 |
| **19** | 0.812 20 | 0.736 30 | 0.650 90 | 0.560 60 | 0.470 30 | 0.384 30 | 0.306 00 | 0.237 70 | 0.180 30 | 0.133 60 | 0.021 90 | 0.002 30 | 0.000 20 |
| **20** | 0.868 20 | 0.805 50 | 0.730 70 | 0.647 20 | 0.559 10 | 0.471 00 | 0.386 90 | 0.310 10 | 0.242 60 | 0.185 50 | 0.035 30 | 0.004 30 | 0.000 40 |
| **21** | 0.910 80 | 0.861 50 | 0.799 10 | 0.725 50 | 0.643 70 | 0.557 70 | 0.471 60 | 0.389 40 | 0.313 90 | 0.247 30 | 0.054 40 | 0.007 60 | 0.000 70 |
| **22** | 0.941 80 | 0.904 70 | 0.855 10 | 0.793 10 | 0.720 60 | 0.640 50 | 0.556 40 | 0.472 30 | 0.391 70 | 0.317 50 | 0.080 60 | 0.012 80 | 0.001 40 |
| **23** | 0.963 30 | 0.936 70 | 0.898 90 | 0.849 00 | 0.787 50 | 0.716 00 | 0.637 40 | 0.555 10 | 0.472 80 | 0.393 90 | 0.114 60 | 0.020 80 | 0.002 60 |
| **24** | 0.977 70 | 0.959 40 | 0.931 70 | 0.893 30 | 0.843 20 | 0.782 20 | 0.711 70 | 0.634 60 | 0.554 00 | 0.473 40 | 0.157 20 | 0.032 40 | 0.004 50 |
| **25** | 0.986 90 | 0.974 80 | 0.955 40 | 0.926 90 | 0.887 80 | 0.837 70 | 0.777 10 | 0.707 70 | 0.631 90 | 0.552 90 | 0.208 40 | 0.048 60 | 0.007 60 |
| **26** | 0.992 50 | 0.984 80 | 0.971 80 | 0.951 40 | 0.922 10 | 0.882 60 | 0.832 40 | 0.772 30 | 0.703 80 | 0.629 40 | 0.267 30 | 0.070 50 | 0.012 30 |
| **27** | 0.995 90 | 0.991 20 | 0.982 70 | 0.968 70 | 0.947 50 | 0.917 50 | 0.877 50 | 0.827 40 | 0.767 70 | 0.700 20 | 0.332 90 | 0.098 80 | 0.019 30 |
| **28** | 0.997 80 | 0.995 00 | 0.989 70 | 0.980 50 | 0.965 70 | 0.943 60 | 0.912 90 | 0.872 60 | 0.822 50 | 0.763 40 | 0.403 10 | 0.134 30 | 0.029 40 |
| **29** | 0.998 90 | 0.997 30 | 0.994 10 | 0.988 20 | 0.978 20 | 0.962 60 | 0.939 80 | 0.908 50 | 0.867 90 | 0.817 90 | 0.475 70 | 0.177 00 | 0.043 20 |
| **30** | 0.999 40 | 0.998 60 | 0.996 70 | 0.993 00 | 0.986 50 | 0.975 80 | 0.959 50 | 0.936 00 | 0.904 20 | 0.863 30 | 0.548 40 | 0.226 90 | 0.061 70 |
| **31** | 0.999 70 | 0.999 30 | 0.998 20 | 0.996 00 | 0.991 90 | 0.984 80 | 0.973 50 | 0.956 40 | 0.932 20 | 0.899 90 | 0.618 60 | 0.283 30 | 0.085 50 |
| **32** | 0.999 90 | 0.999 60 | 0.999 00 | 0.997 80 | 0.995 30 | 0.990 70 | 0.983 10 | 0.971 10 | 0.953 30 | 0.928 50 | 0.684 50 | 0.344 90 | 0.115 30 |
| **33** | 0.999 90 | 0.999 80 | 0.999 50 | 0.998 80 | 0.997 30 | 0.994 50 | 0.989 50 | 0.981 30 | 0.968 60 | 0.950 20 | 0.744 40 | 0.410 20 | 0.151 40 |
| **34** | 1.000 00 | 0.999 90 | 0.999 80 | 0.999 40 | 0.998 50 | 0.996 80 | 0.993 60 | 0.988 20 | 0.979 40 | 0.966 20 | 0.797 30 | 0.477 50 | 0.193 90 |
| **35** | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 70 | 0.999 20 | 0.998 20 | 0.996 20 | 0.992 70 | 0.986 80 | 0.977 50 | 0.842 60 | 0.544 80 | 0.242 40 |
| **36** | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 80 | 0.999 60 | 0.999 00 | 0.997 80 | 0.995 60 | 0.991 80 | 0.985 40 | 0.880 40 | 0.610 20 | 0.296 30 |
| **37** | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 80 | 0.999 50 | 0.998 80 | 0.997 40 | 0.995 00 | 0.990 80 | 0.911 00 | 0.672 10 | 0.354 70 |
| **38** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 70 | 0.999 30 | 0.998 50 | 0.997 00 | 0.994 30 | 0.935 20 | 0.729 10 | 0.416 00 |
| **39** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 90 | 0.999 60 | 0.999 20 | 0.998 30 | 0.996 60 | 0.953 70 | 0.780 20 | 0.479 00 |
| **40** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 80 | 0.999 60 | 0.999 00 | 0.998 00 | 0.967 70 | 0.824 90 | 0.541 90 |
| **41** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 80 | 0.999 50 | 0.998 80 | 0.977 90 | 0.863 10 | 0.603 30 |
| **42** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 70 | 0.999 30 | 0.985 20 | 0.895 00 | 0.661 80 |
| **43** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 80 | 0.999 60 | 0.990 30 | 0.920 90 | 0.716 20 |
| **44** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.999 80 | 0.993 70 | 0.941 50 | 0.765 70 |
| **45** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.996 00 | 0.957 50 | 0.809 70 |
| **46** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.997 50 | 0.969 70 | 0.847 90 |
| **47** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.998 50 | 0.978 80 | 0.880 40 |
| **48** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 10 | 0.985 40 | 0.907 50 |
| **49** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 50 | 0.990 20 | 0.929 70 |
| **50** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 70 | 0.993 50 | 0.947 40 |
| **51** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 80 | 0.995 70 | 0.961 30 |
| **52** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.997 30 | 0.971 90 |
| **53** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.998 30 | 0.980 00 |
| **54** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.998 90 | 0.986 00 |
| **55** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 30 | 0.990 30 |
| **56** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 60 | 0.993 40 |
| **57** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 80 | 0.995 60 |
| **58** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.997 10 |
| **59** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 | 0.998 10 |
| **60** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.998 80 |
| **61** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 20 |
| **62** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 50 |
| **63** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 70 |
| **64** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 80 |
| **65** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 |
| **66** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 0.999 90 |
| **67** | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 | 1.000 00 |

# Основные соотношения

# 1 Функции и формулы

## 1.1 Гамма-функция

### Определение

$$\Gamma(x) = \int_0^{\infty} t^{x-1} e^{-t} dt, \qquad x > 0$$

### Свойства

$$\Gamma(x) = (x-1)\Gamma(x-1)$$

$$\Gamma(n) = (n-1)!, \qquad n = 1,2,3, \dots$$

$$\Gamma\left({}^{1}/_{2}\right) = \sqrt{\pi}$$

## 1.2 Формула Байеса

Пусть $A_1, A_2, \dots, A_n$ - полная группа событий с $P(A_i) \neq 0$, $i = 1,2, \dots, n$.

Для любого события $B$, такого что $P(B) \neq 0$:

$$P(A_i|B) = \frac{P(B|A_i)P(A_i)}{\sum_{j=1}^{n} P\left(B\middle|A_j\right)P\left(A_j\right)}, \qquad i = 1,2, \dots, n$$

# 2 Распределения

## Обозначения

PF = функция вероятности, $p(x)$
PDF = функция плотности вероятности, $f(x)$
DF = функция распределения, $F(x)$
PGF = производящая функция вероятностей, $G(s)$
MGF = производящая функция моментов, $M(t)$

*Примечание*. Если в приведенных ниже пунктах отсутствуют формулы, это означает, что (a) нет простой формулы, или (b) функция не имеет конечного значения, или (c) функция равна нулю.

## 2.1Дискретные распределения

### Биномиальное распределение

Параметры: $n, p$ ($n -$ натуральное, $0 < p < 1,\ q = 1 - p$)

PF: $p(x) = \binom{n}{x} p^x q^{n-x}, \qquad x = 0,1,2,\dots,n$

DF: Функция распределения представлена в таблицах раздела со статистикой.

PGF: $G(s) = (q + ps)^n$

MGF: $M(t) = (q + pe^t)^n$

Моменты: $E(X) = np,\ \ \mathrm{var}(X) = npq$

Коэффициент асимметрии: $\dfrac{q - p}{\sqrt{npq}}$

### Распределение Бернулли

Распределение Бернулли аналогично биномиальному распределению с параметром $n = 1$.

**Распределение Пуассона**

| | |
|---|---|
| Параметр: | $\mu(\mu > 0)$ |
| PF: | $p(x) = \frac{e^{-\mu}\mu^x}{x!}, x = 0,1,2, \ldots$ |
| DF: | Функция распределения представлена в таблицах раздела со статистикой. |
| PGF: | $G(s) = e^{\mu(s-1)}$ |
| MGF: | $M(t) = e^{\mu(e^t-1)}$ |
| Моменты: | $E(X) = \mu, \mathrm{var}(X) = \mu$ |
| Коэффициент асимметрии: | $\frac{1}{\sqrt{\mu}}$ |

**Отрицательное биномиальное распределение - Тип 1**

Параметры: $k, p$ ($k -$ натуральное, $0 < p < 1, q = 1 - p$)

PF: $p(x) = \binom{x-1}{k-1} p^k q^{x-k}, \qquad x = k, k+1, k+2, \ldots$

PGF: $G(s) = \left(\frac{ps}{1-qs}\right)^k$

MGF: $M(t) = \left(\frac{pe^t}{1-qe^t}\right)^k$

Моменты: $E(X) = \frac{k}{p}, \ \operatorname{var}(X) = \frac{kq}{p^2}$

Коэффициент асимметрии: $\frac{2-p}{\sqrt{kq}}$

**Отрицательное биномиальное распределение - Тип 2**

Параметры: $k, p\ (k > 0, 0 < p < 1, q = 1 - p)$

PF: $$p(x) = \frac{\Gamma(k+x)}{\Gamma(x+1)\Gamma(k)} p^k q^x, \quad x = 0,1,2,\ldots$$

PGF: $$G(s) = \left(\frac{p}{1-qs}\right)^k$$

MGF: $$M(t) = \left(\frac{p}{1-qe^t}\right)^k$$

Моменты: $$E(X) = \frac{kq}{p}, \quad \mathrm{var}(X) = \frac{kq}{p^2}$$

Коэффициент асимметрии: $$\frac{2-p}{\sqrt{kq}}$$

**Геометрическое распределение**

Геометрическое распределение аналогично отрицательному биномиальному распределению с параметром $k = 1$.

**Дискретное равномерное распределение**

Параметры: $a, b, h$ ($a < b, h > 0, b - a$ кратно $h$)

PF: $$p(x) = \frac{h}{b-a+h}, \qquad x = a, a+h, a+2h, \dots, b-h, b$$

PGF: $$G(s) = \frac{h}{b-a+h}\left(\frac{s^{b+h} - s^{a}}{s^{h} - 1}\right)$$

MGF: $$M(t) = \frac{h}{b-a+h}\left(\frac{e^{(b+h)t} - e^{at}}{e^{ht} - 1}\right)$$

Моменты: $$E(X) = \frac{1}{2}(a+b), \ \operatorname{var}(X) = \frac{1}{12}(b-a)(b-a+2h)$$

## 2.2 Непрерывные распределения

**Стандартное нормальное распределение - *N* (0,1)**

Параметры: -

PDF: $$f(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}x^2}, \qquad -\infty < x < \infty$$

DF: Функция распределения представлена в таблицах раздела со статистикой.

MGF: $$M(t) = e^{\frac{1}{2}t^2}$$

Моменты: $$E(X) = 0, \ \operatorname{var}(X) = 1$$

$$E(X^r) = \frac{1}{2^{r/2}} \frac{\Gamma(1+r)}{\Gamma\left(1+\frac{r}{2}\right)}, \qquad r = 2,4,6, \dots$$

**Нормальное распределение (распределение Гаусса) -** $N(\mu, \sigma^2)$

Параметры: $\mu, \sigma^2 (\sigma > 0)$

PDF: $$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left\{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right\}, \qquad -\infty < x < \infty$$

MGF: $$M(t) = e^{\mu t + \frac{1}{2}\sigma^2 t^2}$$

Моменты: $$E(X) = \mu, \ \operatorname{var}(X) = \sigma^2$$

**Экспоненциальное распределение**

Параметр: $\lambda (\lambda > 0)$

PDF: $$f(x) = \lambda e^{-\lambda x}, \qquad x > 0$$

DF: $$F(x) = 1 - e^{-\lambda x}$$

MGF: $$M(t) = \left(1 - \frac{t}{\lambda}\right)^{-1}, \qquad t < \lambda$$

Моменты: $$E(X) = \frac{1}{\lambda}, \ \operatorname{var}(X) = \frac{1}{\lambda^2}$$

$$E(X^r) = \frac{\Gamma(1+r)}{\lambda^r}, \qquad r = 1,2,3, \ldots$$

Коэффициент асимметрии: 2

**Гамма-распределение**

Параметры: $\alpha, \lambda\ (\alpha > 0, \lambda > 0)$

PDF: $f(x) = \frac{\lambda^{\alpha}}{\Gamma(\alpha)} x^{\alpha-1} e^{-\lambda x}, \qquad x > 0$

DF: Если $2\alpha$ является целым числом, вероятности гамма-распределения можно найти с помощью соотношения:

$2\lambda X \sim \chi^2_{2\alpha}$

MGF: $M(t) = \left(1 - \frac{t}{\lambda}\right)^{-\alpha}, \qquad t < \lambda$

Моменты: $E(X) = \frac{\alpha}{\lambda}, \quad \mathrm{var}(X) = \frac{\alpha}{\lambda^2}$

$E(X^r) = \frac{\Gamma(\alpha + r)}{\Gamma(\alpha)\lambda^r}, \qquad r = 1,2,1, \ldots$

Коэффициент асимметрии: $\frac{2}{\sqrt{\alpha}}$

**Распределение хи-квадрат с υ степенями свободы - $\chi^2_{\upsilon}$**

Распределение хи-квардат с υ степенями свободы аналогично гамма-распределению с параметрами $\alpha = \frac{\upsilon}{2}$ и $\lambda = \frac{1}{2}$.
Функция распределения хи-квардат распределения представлена в таблицах раздела со статистикой.

**Непрерывное равномерное распределение - $\boldsymbol{U(a,b)}$**

Параметры: $a, b(a < b)$

PDF: $$f(x) = \frac{1}{b-a}, \qquad a < x < b$$

DF: $$F(x) = \frac{x-a}{b-a}$$

MGF: $$M(t) = \frac{1}{(b-a)}\frac{1}{t}(e^{bt} - e^{at})$$

Моменты: $$E(X) = \frac{1}{2}(a+b), \ \operatorname{var}(X) = \frac{1}{12}(b-a)^2$$

$$E(X^r) = \frac{1}{(b-a)}\frac{1}{r+1}(b^{r+1} - a^{r+1}), \qquad r = 1,2,3,\ldots$$

**Бета-распределение**

Параметры: $\alpha, \beta \ (\alpha > 0, \beta > 0)$

PDF: $$f(x) = \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)}x^{\alpha-1}(1-x)^{\beta-1}, \qquad 0 < x < 1$$

Моменты: $$E(X) = \frac{\alpha}{\alpha+\beta}, \quad \operatorname{var}(X) = \frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$$

$$E(X^r) = \frac{\Gamma(\alpha+\beta)\Gamma(\alpha+r)}{\Gamma(\alpha)\Gamma(\alpha+\beta+r)}, \qquad r = 1,2,3,\ldots$$

Коэффициент асимметрии: $$\frac{2(\beta-\alpha)}{(\alpha+\beta+2)}\sqrt{\frac{\alpha+\beta+1}{\alpha\beta}}$$

**Логнормальное распределение**

Параметры: $\mu, \sigma^2 (\sigma > 0)$

PDF: $$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \frac{1}{x} \exp\left\{-\frac{1}{2}\left(\frac{\log x - \mu}{\sigma}\right)^2\right\}, \qquad x > 0$$

Моменты: $$E(X) = e^{\mu + \frac{1}{2}\sigma^2}, \ \operatorname{var}(X) = e^{2\mu + \sigma^2}\left(e^{\sigma^2} - 1\right)$$

$$E(X^r) = e^{r\mu + \frac{1}{2}r^2\sigma^2}, \qquad r = 1,2,3, \ldots$$

Коэффициент асимметрии: $$\left(e^{\sigma^2} + 2\right)\sqrt{e^{\sigma^2} - 1}$$

**Распределение Парето (двухпараметрическое)**

Параметры: $\alpha, \lambda (\alpha > 0, \lambda > 0)$

PDF: $$f(x) = \frac{\alpha\lambda^\alpha}{(\lambda + x)^{\alpha+1}}, \qquad x > 0$$

DF: $$F(x) = 1 - \left(\frac{\lambda}{\lambda + x}\right)^\alpha$$

Моменты: $$E(X) = \frac{\lambda}{\alpha - 1} (\alpha > 1), \ \operatorname{var}(X) = \frac{\alpha\lambda^2}{(\alpha - 1)^2(\alpha - 2)} (\alpha > 2)$$

$$E(X^r) = \frac{\Gamma(\alpha - r)\Gamma(1 + r)}{\Gamma(\alpha)} \lambda^r, \qquad r = 1,2,3, \ldots, r < \alpha$$

Коэффициент асимметрии: $$\frac{2(\alpha + 1)}{(\alpha - 3)} \sqrt{\frac{\alpha - 2}{\alpha}} (\alpha > 3)$$

**Распределение Парето (трехпараметрическое)**

Параметры: $\alpha, \lambda, k (\alpha > 0, \lambda > 0, k > 0)$

PDF: $$f(x) = \frac{\Gamma(\alpha + k)\lambda^{\alpha} x^{k-1}}{\Gamma(\alpha)\Gamma(k)(\lambda + x)^{\alpha+k}}, \qquad x > 0$$

Моменты: $$E(X) = \frac{k\lambda}{\alpha - 1} (\alpha > 1), \ \operatorname{var}(X) = \frac{k(k + \alpha - 1)\lambda^2}{(\alpha - 1)^2(\alpha - 2)} (\alpha > 2)$$

$$E(X^r) = \frac{\Gamma(\alpha - r)\Gamma(k + r)}{\Gamma(\alpha)\Gamma(k)} \lambda^r, \qquad r = 1,2,3, \dots, r < \alpha$$

**Распределение Вейбулла**

Параметры: $c, \gamma (c > 0, \gamma > 0)$

PDF: $$f(x) = c\gamma x^{\gamma - 1} e^{-cx^{\gamma}}, \qquad x > 0$$

DF: $$F(x) = 1 - e^{-cx^{\gamma}}$$

Моменты: $$E(X^r) = \Gamma\left(1 + \frac{r}{\gamma}\right) \frac{1}{c^{r/\gamma}}, \qquad r = 1,2,3, \dots$$

**Распределение Бура**

Параметры: $\alpha, \lambda, \gamma (\alpha > 0, \lambda > 0, \gamma > 0)$

PDF: $$f(x) = \frac{\alpha\gamma\lambda^{\alpha} x^{\gamma - 1}}{(\lambda + x^{\gamma})^{\alpha + 1}}, \qquad x > 0$$

DF: $$F(x) = 1 - \left(\frac{\lambda}{\lambda + x^{\gamma}}\right)^{\alpha}$$

Моменты: $$E(X^r) = \Gamma\left(\alpha - \frac{r}{\gamma}\right) \Gamma\left(1 + \frac{r}{\gamma}\right) \frac{\lambda^{r/\gamma}}{\Gamma(\alpha)}, \qquad r = 1,2,3, \dots, r < \alpha\gamma$$

## 2.3 Обобщенные распределения

### Условное математическое ожидание и дисперсия

$E(Y) = E[E(Y|X)]$

$\text{var}(Y) = \text{var}[E(Y|X)] + E[\text{var}(Y|X)]$

### Моменты обобщенных распределений

Если $X_1, X_2, \ldots$ - одинаково распределенные случайные величины с MGF $M_X(t)$, и $N$ - независимая неотрицательная целочисленная случайная величина, то $S = X_1 + \cdots + X_N$ ( $S = 0$, когда $N = 0$) обладает следующими свойствами:

| | |
|---|---|
| *Математическое ожидание:* | $E(S) = E(N)E(X)$ |
| *Дисперсия:* | $\text{var}(S) = E(N)\text{var}(X) + \text{var}(N)[E(X)]^2$ |
| MGF: | $M_S(t) = M_N[\log M_X(t)]$ |

### Обобщенное распределение Пуассона

| | |
|---|---|
| *Математическое ожидание:* | $\lambda m_1$ |
| *Дисперсия:* | $\lambda m_2$ |
| *Третий центральный момент:* | $\lambda m_3$ |

Где $\lambda = E(N)$ и $m_r = E(X^r)$

## 2.4 Моменты усеченных распределений

### Нормальное распределение

Если $f(x)$ – это PDF $N(\mu, \sigma^2)$ распределения, то

$$\int_L^U xf(x)dx = \mu[\Phi(U') - \Phi(L')] - \sigma[\phi(U') - \phi(L')]$$

где $L' = \frac{L-\mu}{\sigma}$ и $U' = \frac{U-\mu}{\sigma}$.

### Логнормальное распределение

Если $f(x)$ – это PDF логнормального распределения с параметрами $\mu$ и $\sigma^2$, тогда

$$\int_L^U x^k f(x)dx = e^{k\mu + {}^1/_2 k^2\sigma^2}[\Phi(U_k) - \Phi(L_k)]$$

где $$L_k = \frac{\log L - \mu}{\sigma} - k\sigma$$

и $$U_k = \frac{\log U - \mu}{\sigma} - k\sigma$$

# 3 Статистические методы

## 3.1 Методы Байеса

### Соответствие между апостериорным и априорным распределением

Апостериорное распределение
$$\propto \text{Априорное распределение} \times \text{Правдоподобие}$$

Апостериорное распределение $f\left(\theta\middle|\underline{x}\right)$ с параметром $\theta$ связано с априорным распределением $f(\theta)$ через функцию правдоподобия $f\left(\underline{x}\middle|\theta\right)$:

$$f\left(\theta\middle|\underline{x}\right) \propto f(\theta) \times f\left(\underline{x}\middle|\theta\right)$$

### Модель нормального / нормального распределения

Если $\underline{x}$ - случайная выборка размера $n$ из $N(\mu, \sigma^2)$, где $\sigma^2$ известно, и априорное распределение с параметром $\mu$ из $N(\mu_0, \sigma_0^2)$, то апостериорное распределение с параметром $\mu$:

$$\mu|\underline{x} \sim N(\mu_*, \sigma_*^2)$$

где

$$\mu_* = \left(\frac{n\overline{x}}{\sigma^2} + \frac{\mu_0}{\sigma_0^2}\right) \Big/ \left(\frac{n}{\sigma^2} + \frac{1}{\sigma_0^2}\right)$$

и

$$\sigma_*^2 = 1 \Big/ \left(\frac{n}{\sigma^2} + \frac{1}{\sigma_0^2}\right)$$

### 3.2 Эмпирические байесовские модели – Модель 1

**Данные**

$\{X_{ij}, i = 1,2, \dots, N, j = 1,2, \dots, n\}$

$X_{ij}$ представляет собой совокупность требований в *j-ом* году от *i-ого* риска.

**Промежуточные расчеты**

$$\overline{X_i} = \frac{1}{n}\sum_{j=1}^{n} X_{ij}, \quad \overline{X} = \frac{1}{N}\sum_{i=1}^{N} \overline{X_i}$$

**Оценка параметров**

| *Величина* | *Оценочная функция* |
|---|---|
| $E[m(\theta)]$ | $\overline{X}$ |
| $E[s^2(\theta)]$ | $\frac{1}{N}\sum_{i=1}^{N}\left\{\frac{1}{n-1}\sum_{j=1}^{n}\left(X_{ij} - \overline{X_i}\right)^2\right\}$ |
| $\mathrm{var}[m(\theta)]$ | $\frac{1}{N-1}\sum_{i=1}^{N}\left(\overline{X_i} - \overline{X}\right)^2 - \frac{1}{Nn}\sum_{i=1}^{N}\left\{\frac{1}{n-1}\sum_{j=1}^{n}\left(X_{ij} - \overline{X_i}\right)^2\right\}$ |

**Коэффициент доверия**

$$Z = \frac{n}{n + \frac{E[s^2(\theta)]}{\mathrm{var}[m(\theta)]}}$$

### 3.3 Эмпирические байесовские модели – Модель 2

**Данные**

$$\{Y_{ij}, i = 1,2,\dots,N, j = 1,2,\dots,n\}, \{P_{ij}, i = 1,2,\dots,N, j = 1,2,\dots,n\}$$

$Y_{ij}$ представляет собой совокупность требований в *j-ом* году от *i-ого* риска; $P_{ij}$ соответствующий объем риска.

**Промежуточные расчеты**

$$\overline{P_i} = \sum_{j=1}^{n} P_{ij}, \quad \overline{P} = \sum_{i=1}^{N} \overline{P_i}, \quad P^* = \frac{1}{Nn-1} \sum_{i=1}^{N} \overline{P_i} \left(1 - \frac{\overline{P_i}}{\overline{P}}\right)$$

$$X_{ij} = \frac{Y_{ij}}{P_{ij}}, \quad \overline{X_i} = \sum_{j=1}^{n} \frac{P_{ij} X_{ij}}{\overline{P}_i}, \quad \overline{X} = \sum_{i=1}^{N} \sum_{j=1}^{n} \frac{P_{ij} X_{ij}}{\overline{P}}$$

**Оценка параметров**

| *Величина* | *Оценочная функция* |
|---|---|
| $E[m(\theta)]$ | $\overline{X}$ |
| $E[s^2(\theta)]$ | $\frac{1}{N} \sum_{i=1}^{N} \left\{ \frac{1}{n-1} \sum_{j=1}^{n} P_{ij} \left(X_{ij} - \overline{X_i}\right)^2 \right\}$ |
| $\mathrm{var}[m(\theta)]$ | $\frac{1}{P^*} \left( \frac{1}{Nn-1} \sum_{i=1}^{N} \sum_{j=1}^{n} P_{ij} \left(X_{ij} - \overline{X}\right)^2 - \frac{1}{N} \sum_{i=1}^{N} \left\{ \frac{1}{n-1} \sum_{j=1}^{n} P_{ij} \left(X_{ij} - \overline{X_i}\right)^2 \right\} \right)$ |

**Коэффициент доверия**

$$Z_i = \frac{\sum_{j=1}^{n} P_{ij}}{\sum_{j=1}^{n} P_{ij} + \frac{E[s^2(\theta)]}{\mathrm{var}[m(\theta)]}}$$

# 4 Аннуитеты и страховки

## 4.1 Аппроксимация для не годовых периодов

$$\ddot{a}_x^{(m)} \approx \ddot{a}_x - \frac{m-1}{2m}$$

## 4.2 Премии и резервы

### Соотношение между страховками аннуитетами

$A_x = 1 - d\ddot{a}_x, d = 1 - \nu$

$\bar{A}_x = 1 - \delta\bar{a}_x, \delta = ln(1+i)$

Аналогичные соотношения верны для страховок и аннуитетов, действующих в течение определенного срока.

### Резерв нетто-премий

$${}_tV_x = 1 - \frac{\ddot{a}_{x+t}}{\ddot{a}_x}$$

$${}_t\bar{V}_x = 1 - \frac{\bar{a}_{x+t}}{\bar{a}_x}$$

Аналогичные соотношения верны для страховок, действующих в течение определенного срока.