

STAT 1112 MIDTERM TEST FORMULA SHEET

Sample mean: $\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$, **Sample standard deviation:** $s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$.

Percentile Locator $L_p = (n+1)\frac{P}{100}$ **Inter-Quartile Range** $IQR = Q_3 - Q_1$

Probability: $P(\text{event}) = \frac{\text{The number of favourable outcomes}}{\text{The total number of possible outcomes}}$, $0 \leq P(\text{event}) \leq 1$.

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A \text{ or } B) = P(A) + P(B) \text{ for mutually exclusive events}$$

$$P(A \text{ and } B) = P(A)P(B) \text{ if } A \text{ and } B \text{ are independent}$$

$$P(A \text{ and } B) = P(A)P(B|A) \text{ if } A \text{ and } B \text{ are dependent}$$

Conditional probability $P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$

Total Probability Rule: $P(B) = P(B|A) \cdot P(A) + P(B|\bar{A}) \cdot P(\bar{A})$.

Bayes' s Rule: $P(B|A) = \frac{P(A|B) \cdot P(B)}{P(A|B) \cdot P(B) + P(A|\bar{B}) \cdot P(\bar{B})}$

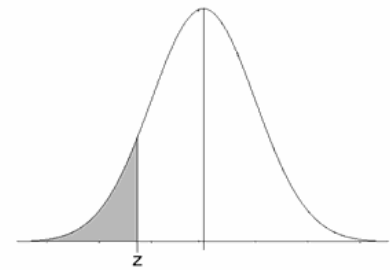
Normal Distribution:

Use $z = \frac{x - \mu}{\sigma}$ to convert the **non-standard** normal distribution to **standard** normal distribution.

Solve for x: $x = (z \times \sigma) + \mu$.

Regression equation: $\hat{y} = b_0 + b_1x$

Standard Normal Cumulative Probability Table



| z | 0.00 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| -3.4 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0002 |
| -3.3 | 0.0005 | 0.0005 | 0.0005 | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 0.0003 |
| -3.2 | 0.0007 | 0.0007 | 0.0006 | 0.0006 | 0.0006 | 0.0006 | 0.0006 | 0.0005 | 0.0005 | 0.0005 |
| -3.1 | 0.0010 | 0.0009 | 0.0009 | 0.0009 | 0.0008 | 0.0008 | 0.0008 | 0.0008 | 0.0007 | 0.0007 |
| -3.0 | 0.0013 | 0.0013 | 0.0013 | 0.0012 | 0.0012 | 0.0011 | 0.0011 | 0.0011 | 0.0010 | 0.0010 |
| -2.9 | 0.0019 | 0.0018 | 0.0018 | 0.0017 | 0.0016 | 0.0016 | 0.0015 | 0.0015 | 0.0014 | 0.0014 |
| -2.8 | 0.0026 | 0.0025 | 0.0024 | 0.0023 | 0.0023 | 0.0022 | 0.0021 | 0.0021 | 0.0020 | 0.0019 |
| -2.7 | 0.0035 | 0.0034 | 0.0033 | 0.0032 | 0.0031 | 0.0030 | 0.0029 | 0.0028 | 0.0027 | 0.0026 |
| -2.6 | 0.0047 | 0.0045 | 0.0044 | 0.0043 | 0.0041 | 0.0040 | 0.0039 | 0.0038 | 0.0037 | 0.0036 |
| -2.5 | 0.0062 | 0.0060 | 0.0059 | 0.0057 | 0.0055 | 0.0054 | 0.0052 | 0.0051 | 0.0049 | 0.0048 |
| -2.4 | 0.0082 | 0.0080 | 0.0078 | 0.0075 | 0.0073 | 0.0071 | 0.0069 | 0.0068 | 0.0066 | 0.0064 |
| -2.3 | 0.0107 | 0.0104 | 0.0102 | 0.0099 | 0.0096 | 0.0094 | 0.0091 | 0.0089 | 0.0087 | 0.0084 |
| -2.2 | 0.0139 | 0.0136 | 0.0132 | 0.0129 | 0.0125 | 0.0122 | 0.0119 | 0.0116 | 0.0113 | 0.0110 |
| -2.1 | 0.0179 | 0.0174 | 0.0170 | 0.0166 | 0.0162 | 0.0158 | 0.0154 | 0.0150 | 0.0146 | 0.0143 |
| -2.0 | 0.0228 | 0.0222 | 0.0217 | 0.0212 | 0.0207 | 0.0202 | 0.0197 | 0.0192 | 0.0188 | 0.0183 |
| -1.9 | 0.0287 | 0.0281 | 0.0274 | 0.0268 | 0.0262 | 0.0256 | 0.0250 | 0.0244 | 0.0239 | 0.0233 |
| -1.8 | 0.0359 | 0.0351 | 0.0344 | 0.0336 | 0.0329 | 0.0322 | 0.0314 | 0.0307 | 0.0301 | 0.0294 |
| -1.7 | 0.0446 | 0.0436 | 0.0427 | 0.0418 | 0.0409 | 0.0401 | 0.0392 | 0.0384 | 0.0375 | 0.0367 |
| -1.6 | 0.0548 | 0.0537 | 0.0526 | 0.0516 | 0.0505 | 0.0495 | 0.0485 | 0.0475 | 0.0465 | 0.0455 |
| -1.5 | 0.0668 | 0.0655 | 0.0643 | 0.0630 | 0.0618 | 0.0606 | 0.0594 | 0.0582 | 0.0571 | 0.0559 |
| -1.4 | 0.0808 | 0.0793 | 0.0778 | 0.0764 | 0.0749 | 0.0735 | 0.0721 | 0.0708 | 0.0694 | 0.0681 |
| -1.3 | 0.0968 | 0.0951 | 0.0934 | 0.0918 | 0.0901 | 0.0885 | 0.0869 | 0.0853 | 0.0838 | 0.0823 |
| -1.2 | 0.1151 | 0.1131 | 0.1112 | 0.1093 | 0.1075 | 0.1056 | 0.1038 | 0.1020 | 0.1003 | 0.0985 |
| -1.1 | 0.1357 | 0.1335 | 0.1314 | 0.1292 | 0.1271 | 0.1251 | 0.1230 | 0.1210 | 0.1190 | 0.1170 |
| -1.0 | 0.1587 | 0.1562 | 0.1539 | 0.1515 | 0.1492 | 0.1469 | 0.1446 | 0.1423 | 0.1401 | 0.1379 |
| -0.9 | 0.1841 | 0.1814 | 0.1788 | 0.1762 | 0.1736 | 0.1711 | 0.1685 | 0.1660 | 0.1635 | 0.1611 |
| -0.8 | 0.2119 | 0.2090 | 0.2061 | 0.2033 | 0.2005 | 0.1977 | 0.1949 | 0.1922 | 0.1894 | 0.1867 |
| -0.7 | 0.2420 | 0.2389 | 0.2358 | 0.2327 | 0.2296 | 0.2266 | 0.2236 | 0.2206 | 0.2177 | 0.2148 |
| -0.6 | 0.2743 | 0.2709 | 0.2676 | 0.2643 | 0.2611 | 0.2578 | 0.2546 | 0.2514 | 0.2483 | 0.2451 |
| -0.5 | 0.3085 | 0.3050 | 0.3015 | 0.2981 | 0.2946 | 0.2912 | 0.2877 | 0.2843 | 0.2810 | 0.2776 |
| -0.4 | 0.3446 | 0.3409 | 0.3372 | 0.3336 | 0.3300 | 0.3264 | 0.3228 | 0.3192 | 0.3156 | 0.3121 |
| -0.3 | 0.3821 | 0.3783 | 0.3745 | 0.3707 | 0.3669 | 0.3632 | 0.3594 | 0.3557 | 0.3520 | 0.3483 |
| -0.2 | 0.4207 | 0.4168 | 0.4129 | 0.4090 | 0.4052 | 0.4013 | 0.3974 | 0.3936 | 0.3897 | 0.3859 |
| -0.1 | 0.4602 | 0.4562 | 0.4522 | 0.4483 | 0.4443 | 0.4404 | 0.4364 | 0.4325 | 0.4286 | 0.4247 |
| -0.0 | 0.5000 | 0.4960 | 0.4920 | 0.4880 | 0.4840 | 0.4801 | 0.4761 | 0.4721 | 0.4681 | 0.4641 |

Binomial Probabilities

Tabulated values are $P(X \leq k) = \sum_{i=0}^k p(x_i)$. (Values are rounded to four decimal places.)

***n* = 5**

| <i>k</i> | <i>p</i> | | | | | | | | | | | | | | |
|----------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 0.01 | 0.05 | 0.10 | 0.20 | 0.25 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.75 | 0.80 | 0.90 | 0.95 | 0.99 |
| 0 | 0.9510 | 0.7738 | 0.5905 | 0.3277 | 0.2373 | 0.1681 | 0.0778 | 0.0313 | 0.0102 | 0.0024 | 0.0010 | 0.0003 | 0.0000 | 0.0000 | 0.0000 |
| 1 | 0.9990 | 0.9774 | 0.9185 | 0.7373 | 0.6328 | 0.5282 | 0.3370 | 0.1875 | 0.0870 | 0.0308 | 0.0156 | 0.0067 | 0.0005 | 0.0000 | 0.0000 |
| 2 | 1.0000 | 0.9988 | 0.9914 | 0.9421 | 0.8965 | 0.8369 | 0.6826 | 0.5000 | 0.3174 | 0.1631 | 0.1035 | 0.0579 | 0.0086 | 0.0012 | 0.0000 |
| 3 | 1.0000 | 1.0000 | 0.9995 | 0.9933 | 0.9844 | 0.9692 | 0.9130 | 0.8125 | 0.6630 | 0.4718 | 0.3672 | 0.2627 | 0.0815 | 0.0226 | 0.0010 |
| 4 | 1.0000 | 1.0000 | 1.0000 | 0.9997 | 0.9990 | 0.9976 | 0.9898 | 0.9688 | 0.9222 | 0.8319 | 0.7627 | 0.6723 | 0.4095 | 0.2262 | 0.0490 |

***n* = 6**

| <i>k</i> | <i>p</i> | | | | | | | | | | | | | | |
|----------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 0.01 | 0.05 | 0.10 | 0.20 | 0.25 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.75 | 0.80 | 0.90 | 0.95 | 0.99 |
| 0 | 0.9415 | 0.7351 | 0.5314 | 0.2621 | 0.1780 | 0.1176 | 0.0467 | 0.0156 | 0.0041 | 0.0007 | 0.0002 | 0.0001 | 0.0000 | 0.0000 | 0.0000 |
| 1 | 0.9985 | 0.9672 | 0.8857 | 0.6554 | 0.5339 | 0.4202 | 0.2333 | 0.1094 | 0.0410 | 0.0109 | 0.0046 | 0.0016 | 0.0001 | 0.0000 | 0.0000 |
| 2 | 1.0000 | 0.9978 | 0.9842 | 0.9011 | 0.8306 | 0.7443 | 0.5443 | 0.3438 | 0.1792 | 0.0705 | 0.0376 | 0.0170 | 0.0013 | 0.0001 | 0.0000 |
| 3 | 1.0000 | 0.9999 | 0.9987 | 0.9830 | 0.9624 | 0.9295 | 0.8208 | 0.6563 | 0.4557 | 0.2557 | 0.1694 | 0.0989 | 0.0159 | 0.0022 | 0.0000 |
| 4 | 1.0000 | 1.0000 | 0.9999 | 0.9984 | 0.9954 | 0.9891 | 0.9590 | 0.8906 | 0.7667 | 0.5798 | 0.4661 | 0.3446 | 0.1143 | 0.0328 | 0.0015 |
| 5 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9998 | 0.9993 | 0.9959 | 0.9844 | 0.9533 | 0.8824 | 0.8220 | 0.7379 | 0.4686 | 0.2649 | 0.0585 |

***n* = 7**

| <i>k</i> | <i>p</i> | | | | | | | | | | | | | | |
|----------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 0.01 | 0.05 | 0.10 | 0.20 | 0.25 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.75 | 0.80 | 0.90 | 0.95 | 0.99 |
| 0 | 0.9321 | 0.6983 | 0.4783 | 0.2097 | 0.1335 | 0.0824 | 0.0280 | 0.0078 | 0.0016 | 0.0002 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1 | 0.9980 | 0.9556 | 0.8503 | 0.5767 | 0.4449 | 0.3294 | 0.1586 | 0.0625 | 0.0188 | 0.0038 | 0.0013 | 0.0004 | 0.0000 | 0.0000 | 0.0000 |
| 2 | 1.0000 | 0.9962 | 0.9743 | 0.8520 | 0.7564 | 0.6471 | 0.4199 | 0.2266 | 0.0963 | 0.0288 | 0.0129 | 0.0047 | 0.0002 | 0.0000 | 0.0000 |
| 3 | 1.0000 | 0.9998 | 0.9973 | 0.9667 | 0.9294 | 0.8740 | 0.7102 | 0.5000 | 0.2898 | 0.1260 | 0.0706 | 0.0333 | 0.0027 | 0.0002 | 0.0000 |
| 4 | 1.0000 | 1.0000 | 0.9998 | 0.9953 | 0.9871 | 0.9712 | 0.9037 | 0.7734 | 0.5801 | 0.3529 | 0.2436 | 0.1480 | 0.0257 | 0.0038 | 0.0000 |
| 5 | 1.0000 | 1.0000 | 1.0000 | 0.9996 | 0.9987 | 0.9962 | 0.9812 | 0.9375 | 0.8414 | 0.6706 | 0.5551 | 0.4233 | 0.1497 | 0.0444 | 0.0020 |
| 6 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9998 | 0.9984 | 0.9922 | 0.9720 | 0.9176 | 0.8665 | 0.7903 | 0.5217 | 0.3017 | 0.0679 |

***n* = 8**

| <i>k</i> | <i>p</i> | | | | | | | | | | | | | | |
|----------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 0.01 | 0.05 | 0.10 | 0.20 | 0.25 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.75 | 0.80 | 0.90 | 0.95 | 0.99 |
| 0 | 0.9227 | 0.6634 | 0.4305 | 0.1678 | 0.1001 | 0.0576 | 0.0168 | 0.0039 | 0.0007 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1 | 0.9973 | 0.9428 | 0.8131 | 0.5033 | 0.3671 | 0.2553 | 0.1064 | 0.0352 | 0.0085 | 0.0013 | 0.0004 | 0.0001 | 0.0000 | 0.0000 | 0.0000 |
| 2 | 0.9999 | 0.9942 | 0.9619 | 0.7969 | 0.6785 | 0.5518 | 0.3154 | 0.1445 | 0.0498 | 0.0113 | 0.0042 | 0.0012 | 0.0000 | 0.0000 | 0.0000 |
| 3 | 1.0000 | 0.9996 | 0.9950 | 0.9437 | 0.8862 | 0.8059 | 0.5941 | 0.3633 | 0.1737 | 0.0580 | 0.0273 | 0.0104 | 0.0004 | 0.0000 | 0.0000 |
| 4 | 1.0000 | 1.0000 | 0.9996 | 0.9896 | 0.9727 | 0.9420 | 0.8263 | 0.6367 | 0.4059 | 0.1941 | 0.1138 | 0.0563 | 0.0050 | 0.0004 | 0.0000 |
| 5 | 1.0000 | 1.0000 | 1.0000 | 0.9988 | 0.9958 | 0.9887 | 0.9502 | 0.8555 | 0.6846 | 0.4482 | 0.3215 | 0.2031 | 0.0381 | 0.0058 | 0.0001 |
| 6 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9996 | 0.9987 | 0.9915 | 0.9648 | 0.8936 | 0.7447 | 0.6329 | 0.4967 | 0.1869 | 0.0572 | 0.0027 |
| 7 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9993 | 0.9961 | 0.9832 | 0.9424 | 0.8999 | 0.8322 | 0.5695 | 0.3366 | 0.0773 |

$n = 9$

| k | p | | | | | | | | | | | | | | |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 0.01 | 0.05 | 0.10 | 0.20 | 0.25 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.75 | 0.80 | 0.90 | 0.95 | 0.99 |
| 0 | 0.9135 | 0.6302 | 0.3874 | 0.1342 | 0.0751 | 0.0404 | 0.0101 | 0.0020 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1 | 0.9966 | 0.9288 | 0.7748 | 0.4362 | 0.3003 | 0.1960 | 0.0705 | 0.0195 | 0.0038 | 0.0004 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 2 | 0.9999 | 0.9916 | 0.9470 | 0.7382 | 0.6007 | 0.4628 | 0.2318 | 0.0898 | 0.0250 | 0.0043 | 0.0013 | 0.0003 | 0.0000 | 0.0000 | 0.0000 |
| 3 | 1.0000 | 0.9994 | 0.9917 | 0.9144 | 0.8343 | 0.7297 | 0.4826 | 0.2539 | 0.0994 | 0.0253 | 0.0100 | 0.0031 | 0.0001 | 0.0000 | 0.0000 |
| 4 | 1.0000 | 1.0000 | 0.9991 | 0.9804 | 0.9511 | 0.9012 | 0.7334 | 0.5000 | 0.2666 | 0.0988 | 0.0489 | 0.0196 | 0.0009 | 0.0000 | 0.0000 |
| 5 | 1.0000 | 1.0000 | 0.9999 | 0.9969 | 0.9900 | 0.9747 | 0.9006 | 0.7461 | 0.5174 | 0.2703 | 0.1657 | 0.0856 | 0.0083 | 0.0006 | 0.0000 |
| 6 | 1.0000 | 1.0000 | 1.0000 | 0.9997 | 0.9987 | 0.9957 | 0.9750 | 0.9102 | 0.7682 | 0.5372 | 0.3993 | 0.2618 | 0.0530 | 0.0084 | 0.0001 |
| 7 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9996 | 0.9962 | 0.9805 | 0.9295 | 0.8040 | 0.6997 | 0.5638 | 0.2252 | 0.0712 | 0.0034 |
| 8 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9997 | 0.9980 | 0.9899 | 0.9596 | 0.9249 | 0.8658 | 0.6126 | 0.3698 | 0.0865 |

$n = 10$

| k | p | | | | | | | | | | | | | | |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 0.01 | 0.05 | 0.10 | 0.20 | 0.25 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.75 | 0.80 | 0.90 | 0.95 | 0.99 |
| 0 | 0.9044 | 0.5987 | 0.3487 | 0.1074 | 0.0563 | 0.0282 | 0.0060 | 0.0010 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1 | 0.9957 | 0.9139 | 0.7361 | 0.3758 | 0.2440 | 0.1493 | 0.0464 | 0.0107 | 0.0017 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 2 | 0.9999 | 0.9885 | 0.9298 | 0.6778 | 0.5256 | 0.3828 | 0.1673 | 0.0547 | 0.0123 | 0.0016 | 0.0004 | 0.0001 | 0.0000 | 0.0000 | 0.0000 |
| 3 | 1.0000 | 0.9990 | 0.9872 | 0.8791 | 0.7759 | 0.6496 | 0.3823 | 0.1719 | 0.0548 | 0.0106 | 0.0035 | 0.0009 | 0.0000 | 0.0000 | 0.0000 |
| 4 | 1.0000 | 0.9999 | 0.9984 | 0.9672 | 0.9219 | 0.8497 | 0.6331 | 0.3770 | 0.1662 | 0.0473 | 0.0197 | 0.0064 | 0.0001 | 0.0000 | 0.0000 |
| 5 | 1.0000 | 1.0000 | 0.9999 | 0.9936 | 0.9803 | 0.9527 | 0.8338 | 0.6230 | 0.3669 | 0.1503 | 0.0781 | 0.0328 | 0.0016 | 0.0001 | 0.0000 |
| 6 | 1.0000 | 1.0000 | 1.0000 | 0.9991 | 0.9965 | 0.9894 | 0.9452 | 0.8281 | 0.6177 | 0.3504 | 0.2241 | 0.1209 | 0.0128 | 0.0010 | 0.0000 |
| 7 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9996 | 0.9984 | 0.9877 | 0.9453 | 0.8327 | 0.6172 | 0.4744 | 0.3222 | 0.0702 | 0.0115 | 0.0001 |
| 8 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9983 | 0.9893 | 0.9536 | 0.8507 | 0.7560 | 0.6242 | 0.2639 | 0.0861 | 0.0043 |
| 9 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9990 | 0.9940 | 0.9718 | 0.9437 | 0.8926 | 0.6513 | 0.4013 | 0.0956 |

$n = 15$

| k | p | | | | | | | | | | | | | | |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 0.01 | 0.05 | 0.10 | 0.20 | 0.25 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.75 | 0.80 | 0.90 | 0.95 | 0.99 |
| 0 | 0.8601 | 0.4633 | 0.2059 | 0.0352 | 0.0134 | 0.0047 | 0.0005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1 | 0.9904 | 0.8290 | 0.5490 | 0.1671 | 0.0802 | 0.0353 | 0.0052 | 0.0005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 2 | 0.9996 | 0.9638 | 0.8159 | 0.3980 | 0.2361 | 0.1268 | 0.0271 | 0.0037 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 3 | 1.0000 | 0.9945 | 0.9444 | 0.6482 | 0.4613 | 0.2969 | 0.0905 | 0.0176 | 0.0019 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 4 | 1.0000 | 0.9994 | 0.9873 | 0.8358 | 0.6865 | 0.5155 | 0.2173 | 0.0592 | 0.0093 | 0.0007 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 5 | 1.0000 | 0.9999 | 0.9978 | 0.9389 | 0.8516 | 0.7216 | 0.4032 | 0.1509 | 0.0338 | 0.0037 | 0.0008 | 0.0001 | 0.0000 | 0.0000 | 0.0000 |
| 6 | 1.0000 | 1.0000 | 0.9997 | 0.9819 | 0.9434 | 0.8689 | 0.6098 | 0.3036 | 0.0950 | 0.0152 | 0.0042 | 0.0008 | 0.0000 | 0.0000 | 0.0000 |
| 7 | 1.0000 | 1.0000 | 1.0000 | 0.9958 | 0.9827 | 0.9500 | 0.7869 | 0.5000 | 0.2131 | 0.0500 | 0.0173 | 0.0042 | 0.0000 | 0.0000 | 0.0000 |
| 8 | 1.0000 | 1.0000 | 1.0000 | 0.9992 | 0.9958 | 0.9848 | 0.9050 | 0.6964 | 0.3902 | 0.1311 | 0.0566 | 0.0181 | 0.0003 | 0.0000 | 0.0000 |
| 9 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9992 | 0.9963 | 0.9662 | 0.8491 | 0.5968 | 0.2784 | 0.1484 | 0.0611 | 0.0022 | 0.0001 | 0.0000 |
| 10 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9993 | 0.9907 | 0.9408 | 0.7827 | 0.4845 | 0.3135 | 0.1642 | 0.0127 | 0.0006 | 0.0000 |
| 11 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9981 | 0.9824 | 0.9095 | 0.7031 | 0.5387 | 0.3518 | 0.0556 | 0.0055 | 0.0000 |
| 12 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9997 | 0.9963 | 0.9729 | 0.8732 | 0.7639 | 0.6020 | 0.1841 | 0.0362 | 0.0004 |
| 13 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9995 | 0.9948 | 0.9647 | 0.9198 | 0.8329 | 0.4510 | 0.1710 | 0.0096 |
| 14 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9995 | 0.9953 | 0.9866 | 0.9648 | 0.7941 | 0.5367 | 0.1399 |

$n = 20$

| k | p | | | | | | | | | | | | | | |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 0.01 | 0.05 | 0.10 | 0.20 | 0.25 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.75 | 0.80 | 0.90 | 0.95 | 0.99 |
| 0 | 0.8179 | 0.3585 | 0.1216 | 0.0115 | 0.0032 | 0.0008 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1 | 0.9831 | 0.7358 | 0.3917 | 0.0692 | 0.0243 | 0.0076 | 0.0005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 2 | 0.9990 | 0.9245 | 0.6769 | 0.2061 | 0.0913 | 0.0355 | 0.0036 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 3 | 1.0000 | 0.9841 | 0.8670 | 0.4114 | 0.2252 | 0.1071 | 0.0160 | 0.0013 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 4 | 1.0000 | 0.9974 | 0.9568 | 0.6296 | 0.4148 | 0.2375 | 0.0510 | 0.0059 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 5 | 1.0000 | 0.9997 | 0.9887 | 0.8042 | 0.6172 | 0.4164 | 0.1256 | 0.0207 | 0.0016 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 6 | 1.0000 | 1.0000 | 0.9976 | 0.9133 | 0.7858 | 0.6080 | 0.2500 | 0.0577 | 0.0065 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 7 | 1.0000 | 1.0000 | 0.9996 | 0.9679 | 0.8982 | 0.7723 | 0.4159 | 0.1316 | 0.0210 | 0.0013 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 8 | 1.0000 | 1.0000 | 0.9999 | 0.9900 | 0.9591 | 0.8867 | 0.5956 | 0.2517 | 0.0565 | 0.0051 | 0.0009 | 0.0001 | 0.0000 | 0.0000 | 0.0000 |
| 9 | 1.0000 | 1.0000 | 1.0000 | 0.9974 | 0.9861 | 0.9520 | 0.7553 | 0.4119 | 0.1275 | 0.0171 | 0.0039 | 0.0006 | 0.0000 | 0.0000 | 0.0000 |
| 10 | 1.0000 | 1.0000 | 1.0000 | 0.9994 | 0.9961 | 0.9829 | 0.8725 | 0.5881 | 0.2447 | 0.0480 | 0.0139 | 0.0026 | 0.0000 | 0.0000 | 0.0000 |
| 11 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9991 | 0.9949 | 0.9435 | 0.7483 | 0.4044 | 0.1133 | 0.0409 | 0.0100 | 0.0001 | 0.0000 | 0.0000 |
| 12 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9998 | 0.9987 | 0.9790 | 0.8684 | 0.5841 | 0.2277 | 0.1018 | 0.0321 | 0.0004 | 0.0000 | 0.0000 |
| 13 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9997 | 0.9935 | 0.9423 | 0.7500 | 0.3920 | 0.2142 | 0.0867 | 0.0024 | 0.0000 | 0.0000 |
| 14 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9984 | 0.9793 | 0.8744 | 0.5836 | 0.3828 | 0.1958 | 0.0113 | 0.0003 | 0.0000 |
| 15 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9997 | 0.9941 | 0.9490 | 0.7625 | 0.5852 | 0.3704 | 0.0432 | 0.0026 | 0.0000 |
| 16 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9987 | 0.9840 | 0.8929 | 0.7748 | 0.5886 | 0.1330 | 0.0159 | 0.0000 |
| 17 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9998 | 0.9964 | 0.9645 | 0.9087 | 0.7939 | 0.3231 | 0.0755 | 0.0010 |
| 18 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9995 | 0.9924 | 0.9757 | 0.9308 | 0.6083 | 0.2642 | 0.0169 |
| 19 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9992 | 0.9968 | 0.9885 | 0.8784 | 0.6415 | 0.1821 |

 $n = 25$

| k | p | | | | | | | | | | | | | | |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 0.01 | 0.05 | 0.10 | 0.20 | 0.25 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.75 | 0.80 | 0.90 | 0.95 | 0.99 |
| 0 | 0.7778 | 0.2774 | 0.0718 | 0.0038 | 0.0008 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 1 | 0.9742 | 0.6424 | 0.2712 | 0.0274 | 0.0070 | 0.0016 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 2 | 0.9980 | 0.8729 | 0.5371 | 0.0982 | 0.0321 | 0.0090 | 0.0004 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 3 | 0.9999 | 0.9659 | 0.7636 | 0.2340 | 0.0962 | 0.0332 | 0.0024 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 4 | 1.0000 | 0.9928 | 0.9020 | 0.4207 | 0.2137 | 0.0905 | 0.0095 | 0.0005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 5 | 1.0000 | 0.9988 | 0.9666 | 0.6167 | 0.3783 | 0.1935 | 0.0294 | 0.0020 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 6 | 1.0000 | 0.9998 | 0.9905 | 0.7800 | 0.5611 | 0.3407 | 0.0736 | 0.0073 | 0.0003 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 7 | 1.0000 | 1.0000 | 0.9977 | 0.8909 | 0.7265 | 0.5118 | 0.1536 | 0.0216 | 0.0012 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 8 | 1.0000 | 1.0000 | 0.9995 | 0.9532 | 0.8506 | 0.6769 | 0.2735 | 0.0539 | 0.0043 | 0.0001 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 9 | 1.0000 | 1.0000 | 0.9999 | 0.9827 | 0.9287 | 0.8106 | 0.4246 | 0.1148 | 0.0132 | 0.0005 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 10 | 1.0000 | 1.0000 | 1.0000 | 0.9944 | 0.9703 | 0.9022 | 0.5858 | 0.2122 | 0.0344 | 0.0018 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| 11 | 1.0000 | 1.0000 | 1.0000 | 0.9985 | 0.9893 | 0.9558 | 0.7323 | 0.3450 | 0.0778 | 0.0060 | 0.0009 | 0.0001 | 0.0000 | 0.0000 | 0.0000 |
| 12 | 1.0000 | 1.0000 | 1.0000 | 0.9996 | 0.9966 | 0.9825 | 0.8462 | 0.5000 | 0.1538 | 0.0175 | 0.0034 | 0.0004 | 0.0000 | 0.0000 | 0.0000 |
| 13 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9991 | 0.9940 | 0.9222 | 0.6550 | 0.2677 | 0.0442 | 0.0107 | 0.0015 | 0.0000 | 0.0000 | 0.0000 |
| 14 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9998 | 0.9982 | 0.9656 | 0.7878 | 0.4142 | 0.0978 | 0.0297 | 0.0056 | 0.0000 | 0.0000 | 0.0000 |

$n = 25$ (Continued)

| k | p | | | | | | | | | | | | | | |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 0.01 | 0.05 | 0.10 | 0.20 | 0.25 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.75 | 0.80 | 0.90 | 0.95 | 0.99 |
| 15 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9995 | 0.9868 | 0.8852 | 0.5754 | 0.1894 | 0.0713 | 0.0173 | 0.0001 | 0.0000 | 0.0000 |
| 16 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9957 | 0.9461 | 0.7265 | 0.3231 | 0.1494 | 0.0468 | 0.0005 | 0.0000 | 0.0000 |
| 17 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9988 | 0.9784 | 0.8464 | 0.4882 | 0.2735 | 0.1091 | 0.0023 | 0.0000 | 0.0000 |
| 18 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9997 | 0.9927 | 0.9264 | 0.6593 | 0.4389 | 0.2200 | 0.0095 | 0.0002 | 0.0000 |
| 19 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9980 | 0.9706 | 0.8065 | 0.6217 | 0.3833 | 0.0334 | 0.0012 | 0.0000 |
| 20 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9995 | 0.9905 | 0.9095 | 0.7863 | 0.5793 | 0.0980 | 0.0072 | 0.0000 |
| 21 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9976 | 0.9668 | 0.9038 | 0.7660 | 0.2364 | 0.0341 | 0.0001 |
| 22 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9996 | 0.9910 | 0.9679 | 0.9018 | 0.4629 | 0.1271 | 0.0020 |
| 23 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9984 | 0.9930 | 0.9726 | 0.7288 | 0.3576 | 0.0258 |
| 24 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 0.9999 | 0.9992 | 0.9962 | 0.9282 | 0.7226 | 0.2222 |