

**102106T4COH**  
**Community Health Level 5**  
**AITC/CH/CC/01/5/B**  
**Apply Statistics in Community Health**  
**July/August 2025**



**AMREF INTERNATIONAL TRAINING CENTER**

**CANDIDATE WRITTEN ASSESSMENT**

**Time: 3 HOURS**

**INSTRUCTIONS TO CANDIDATE**

1. Marks for each question are indicated in the brackets.
2. The paper consists of **TWO** sections: **A** and **B**.
3. Candidates are provided with a separate answer booklet
4. **DO NOT** write on this question paper.

**This paper consists of THREE (3) printed pages**  
**Candidates should check the question paper to ascertain that all pages**  
**are printed as indicated and that no questions are missing.**

**SECTION A: (40 MARKS)**

*Answer All Questions in This Section.*

1. Define the following terms as used in Health Statistics.
  - i) Health Statistics. (2 Marks)
  - ii) Parameter. (2 Marks)
2. Differentiate the following terms.
  - i) Descriptive statistics and inferential statistics. (2 Marks)
  - ii) Sample and Census. (2 Marks)
  - iii) Primary data and secondary data (2 Marks)
3. The birth registers for a district show 2456 male births and 2102 female births. Calculate the Sex Ratio at Birth(SRAB) and interpret your results. (3 Marks)
4. Given that in a section of a country, some 54 children were born to 84 women aged 18-27 years during a calendar year. Calculate the Age specific fertility rate (ASFR) for this population and interpret your results. (2 Marks)
5. State without proof the Central Limit Theorem (CLT). (2 Marks)
6. Define the term correlation analysis and state two types of correlation. (3 Marks)
7. State and explain the scales of measurements giving an example in each case. (4 Marks)
8. Explain three applications of statistics in community health. (3 Marks)
9. Distinguish between a ratio and a rate in the context of health statistics. (2 Marks)
10. Consider the following set;  $x = \{11,13,15,16,19,22,13,20\}$   
Calculate;
  - i) Arithmetic mean. (2 Marks)
  - ii) Harmonic mean. (2 Marks)
11. If health measurements in a population are normally distributed with a mean of 10 and variance of 4, what proportion of individuals have values less than 12.5? (3 Marks)
12. At an outpatient testing center, the number of cardiograms performed each day for 20 days is shown. Construct a stem and leaf plot for the data clearly explaining each step.  
25, 31, 20, 32, 13, 14, 43, 02, 57, 23, 36, 32, 33, 32, 44, 32, 52, 44, 51, 45. (4 Marks)

**SECTION B: (60 MARKS)**

*Answer any THREE questions in this section*

13.

- a) In public health research, effective communication of data is essential for informed decision-making, community engagement, and policy development. Explain why presenting statistical data graphically is often more effective than presenting it in numerical tables or frequency distributions, especially when addressing non-technical audiences such as community members, policymakers, or health workers. (3 Marks)
- b) The following table shows the distribution of systolic blood pressure (in mmHg) recorded for a group of patients during a health screening exercise.

|                                |         |         |         |         |         |         |         |
|--------------------------------|---------|---------|---------|---------|---------|---------|---------|
| Systolic Blood Pressure (mmHg) | 100-104 | 105-109 | 110-114 | 115-119 | 120-124 | 125-129 | 130-134 |
| Number of patients.            | 2       | 8       | 18      | 13      | 7       | 1       | 1       |

Construct a cumulative frequency curve (ogive) and histogram to represent this data.

(7 Marks)

- c) The following data were collected during a community health study assessing the relationship between Community Health Volunteers' (CHVs) years of service (x) and their health education effectiveness scores (y) based on household feedback. Calculate the Spearman's Rank Correlation Coefficient (R) to evaluate whether there is a relationship between the number of years a CHV has served and their effectiveness in delivering health education. (10 Marks)

|                            |      |      |      |      |      |      |      |      |      |      |
|----------------------------|------|------|------|------|------|------|------|------|------|------|
| CHV<br>(Subject)           | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   |
| Years of<br>Service (x)    | 8.3  | 8.6  | 9.2  | 9.8  | 8.0  | 7.8  | 9.4  | 9.0  | 7.2  | 8.6  |
| Effectiveness<br>Score (y) | 2300 | 2250 | 2380 | 2400 | 2000 | 2100 | 2360 | 2350 | 2000 | 2260 |

14.

- a) The following data were collected during a community health survey assessing malaria control in Kakamega County. The table shows the number of mosquito nets owned per household (X) and the corresponding number of malaria cases reported in the household over six months (Y).

Develop a regression equation that can be used to predict the number of malaria cases based on the number of mosquito nets in a household. (7 Marks)

|  |    |    |     |    |    |    |    |    |    |    |
|--|----|----|-----|----|----|----|----|----|----|----|
| Household<br>(ID)                      | 1  | 2  | 3   | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
| Mosquito<br>Nets<br>Owned (x)          | 98 | 66 | 100 | 96 | 88 | 45 | 76 | 60 | 74 | 82 |
| Malaria<br>Cases in 6<br>Months<br>(y) | 90 | 74 | 98  | 88 | 80 | 62 | 78 | 74 | 86 | 80 |

- b) A girl lists the number of male and female children her parent and her parent's brothers and sisters have. Her results were as tabulated below:

|                       | Males | Females |
|-----------------------|-------|---------|
| Her parents           | 2     | 5       |
| Her mother's sisters  | 6     | 8       |
| Her mother's brothers | 4     | 8       |
| Her father's sisters  | 5     | 8       |
| Her father's brothers | 7     | 7       |
| Totals                | 24    | 36      |

- i) Find the probability that, if the girl has children of her own, the 1<sup>st</sup> born will be girl. (2 Marks)
- ii) If the girl eventually has 10 children, how many are likely to be males? (2 Marks)
- c) In a clinical trial, a diagnostic test is administered to 6 patients. The probability that the test correctly identifies a disease (i.e., gives a positive result when the disease is present) is 0.3. Let  $X$  represent the number of patients who receive a positive result. Calculate:  $P(X = 2)$ . (2 Marks)
- d) Estimate the mean, median and mode for the following frequency distribution. (7 Marks)

| Class | frequency |
|-------|-----------|
| 5-9   | 5         |
| 10-14 | 12        |
| 15-19 | 32        |
| 20-24 | 40        |
| 25-29 | 16        |
| 30-34 | 9         |
| 36-39 | 6         |

15.

- a) In 2024, Kitale County Referral Hospital had a specific number of allocated 92 beds and 25 cots. During the same year, the hospital admitted 3,144 patients and recorded 3,242 discharges and deaths. The total number of inpatient days for the year was 28,600.

Using this information, calculate the following for administrative planning and evaluation at Kitale County Referral Hospital:

- i) Available bed days. (2 Marks)
  - ii) Excess or vacant bed days. (2 Marks)
  - iii) Daily bed occupancy rate. (2 Marks)
  - iv) Turnover interval. (2 Marks)
  - v) Turnover per bed. (2 Marks)
- b) As part of a community health survey, Amina, a community health officer, collected data on households' health awareness scores (rated from 0 to 100). The scores were grouped as follows:

| Health Score Range | Number of Households (f) |
|--------------------|--------------------------|
| 50-59              | 3                        |
| 60-69              | 5                        |
| 70-79              | 9                        |
| 80-89              | 12                       |
| 90-100             | 8                        |

Using the data, calculate the following measures to assist Amina in evaluating the overall health awareness of the community:

- i) Mean health awareness score. (2 Marks)
- ii) Variance. (4 Marks)
- iii) Standard deviation. (2 Marks)
- iv) Coefficient of variation. (2 Marks)

16.

a) During a cardiovascular screening program conducted by Amref Health Africa, it was found that pulse rates of adult men are approximately normally distributed with a mean of 70 and standard deviation of 8. Based on this information, calculate the probability that a randomly selected adult male will have a pulse rate that is:

i) Less than 72. (2 Marks)

ii) Greater than 76. (2 Marks)

iii) Between 64 and 76. (2 Marks)

b) A community health research team in Trans Nzoia County is planning a study to assess the prevalence of malnutrition among children under five years old. The county is divided into multiple sub-counties, each with several health facilities and villages.

i) Explain why the researchers should use a Probability Sampling method for this study. (2 Marks)

ii) In a community health study to assess nutrition status of children under five years in Trans Nzoia County, explain THREE probability sampling methods that can be used. (6 Marks)

c) The following data shows the hemoglobin levels (g/dL) of children under five years collected during a nutrition assessment conducted by Amref Health Africa in Kiambu County:

15.0, 17.4, 10.3, 9.2, 20.7, 18.9, 16.6, 22.4, 23.7, 18.6, 26.1, 16.5, 19.7, 12.9, 15.7,  
30.8, 15.4, 20.3, 24.0, 29.6, 18.3, 23.7, 17.8, 24.6, 23.0, 21.4, 32.8, 12.5, 17.5, 18.3  
23.2, 21.6, 20.8, 29.8, 24.5, 28.4, 13.5, 17.1, 27.1, 27.9

Organize this data into a grouped frequency table. (6 Marks)

**STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.**

| Z    | .00    | .01    | .02    | .03    | .04    | .05    | .06    | .07    | .08    | .09    |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| -3.9 | .00005 | .00005 | .00004 | .00004 | .00004 | .00004 | .00004 | .00004 | .00003 | .00003 |
| -3.8 | .00007 | .00007 | .00007 | .00006 | .00006 | .00006 | .00006 | .00005 | .00005 | .00005 |
| -3.7 | .00011 | .00010 | .00010 | .00010 | .00009 | .00009 | .00008 | .00008 | .00008 | .00008 |
| -3.6 | .00016 | .00015 | .00015 | .00014 | .00014 | .00013 | .00013 | .00012 | .00012 | .00011 |
| -3.5 | .00023 | .00022 | .00022 | .00021 | .00020 | .00019 | .00019 | .00018 | .00017 | .00017 |
| -3.4 | .00034 | .00032 | .00031 | .00030 | .00029 | .00028 | .00027 | .00026 | .00025 | .00024 |
| -3.3 | .00048 | .00047 | .00045 | .00043 | .00042 | .00040 | .00039 | .00038 | .00036 | .00035 |
| -3.2 | .00069 | .00066 | .00064 | .00062 | .00060 | .00058 | .00056 | .00054 | .00052 | .00050 |
| -3.1 | .00097 | .00094 | .00090 | .00087 | .00084 | .00082 | .00079 | .00076 | .00074 | .00071 |
| -3.0 | .00135 | .00131 | .00126 | .00122 | .00118 | .00114 | .00111 | .00107 | .00104 | .00100 |
| -2.9 | .00187 | .00181 | .00175 | .00169 | .00164 | .00159 | .00154 | .00149 | .00144 | .00139 |
| -2.8 | .00256 | .00248 | .00240 | .00233 | .00226 | .00219 | .00212 | .00205 | .00199 | .00193 |
| -2.7 | .00347 | .00336 | .00326 | .00317 | .00307 | .00298 | .00289 | .00280 | .00272 | .00264 |
| -2.6 | .00466 | .00453 | .00440 | .00427 | .00415 | .00402 | .00391 | .00379 | .00368 | .00357 |
| -2.5 | .00621 | .00604 | .00587 | .00570 | .00554 | .00539 | .00523 | .00508 | .00494 | .00480 |
| -2.4 | .00820 | .00798 | .00776 | .00755 | .00734 | .00714 | .00695 | .00676 | .00657 | .00639 |
| -2.3 | .01072 | .01044 | .01017 | .00990 | .00964 | .00939 | .00914 | .00889 | .00866 | .00842 |
| -2.2 | .01390 | .01355 | .01321 | .01287 | .01255 | .01222 | .01191 | .01160 | .01130 | .01101 |
| -2.1 | .01786 | .01743 | .01700 | .01659 | .01618 | .01578 | .01539 | .01500 | .01463 | .01426 |
| -2.0 | .02275 | .02222 | .02169 | .02118 | .02068 | .02018 | .01970 | .01923 | .01876 | .01831 |
| -1.9 | .02872 | .02807 | .02743 | .02680 | .02619 | .02559 | .02500 | .02442 | .02385 | .02330 |
| -1.8 | .03593 | .03515 | .03438 | .03362 | .03288 | .03216 | .03144 | .03074 | .03005 | .02938 |
| -1.7 | .04457 | .04363 | .04272 | .04182 | .04093 | .04006 | .03920 | .03836 | .03754 | .03673 |
| -1.6 | .05480 | .05370 | .05262 | .05155 | .05050 | .04947 | .04846 | .04746 | .04648 | .04551 |
| -1.5 | .06681 | .06552 | .06426 | .06301 | .06178 | .06057 | .05938 | .05821 | .05705 | .05592 |
| -1.4 | .08076 | .07927 | .07780 | .07636 | .07493 | .07353 | .07215 | .07078 | .06944 | .06811 |
| -1.3 | .09680 | .09510 | .09342 | .09176 | .09012 | .08851 | .08691 | .08534 | .08379 | .08226 |
| -1.2 | .11507 | .11314 | .11123 | .10935 | .10749 | .10565 | .10383 | .10204 | .10027 | .09853 |
| -1.1 | .13567 | .13350 | .13136 | .12924 | .12714 | .12507 | .12302 | .12100 | .11900 | .11702 |
| -1.0 | .15866 | .15625 | .15386 | .15151 | .14917 | .14686 | .14457 | .14231 | .14007 | .13786 |
| -0.9 | .18406 | .18141 | .17879 | .17619 | .17361 | .17106 | .16853 | .16602 | .16354 | .16109 |
| -0.8 | .21186 | .20897 | .20611 | .20327 | .20045 | .19766 | .19489 | .19215 | .18943 | .18673 |
| -0.7 | .24196 | .23885 | .23576 | .23270 | .22965 | .22663 | .22363 | .22065 | .21770 | .21476 |
| -0.6 | .27425 | .27093 | .26763 | .26435 | .26109 | .25785 | .25463 | .25143 | .24825 | .24510 |
| -0.5 | .30854 | .30503 | .30153 | .29806 | .29460 | .29116 | .28774 | .28434 | .28096 | .27760 |
| -0.4 | .34458 | .34090 | .33724 | .33360 | .32997 | .32636 | .32276 | .31918 | .31561 | .31207 |
| -0.3 | .38209 | .37828 | .37448 | .37070 | .36693 | .36317 | .35942 | .35569 | .35197 | .34827 |
| -0.2 | .42074 | .41683 | .41294 | .40905 | .40517 | .40129 | .39743 | .39358 | .38974 | .38591 |
| -0.1 | .46017 | .45620 | .45224 | .44828 | .44433 | .44038 | .43644 | .43251 | .42858 | .42465 |
| -0.0 | .50000 | .49601 | .49202 | .48803 | .48405 | .48006 | .47608 | .47210 | .46812 | .46414 |



**STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.**

| Z   | .00    | .01    | .02    | .03    | .04    | .05    | .06    | .07    | .08    | .09    |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0.0 | .50000 | .50399 | .50798 | .51197 | .51595 | .51994 | .52392 | .52790 | .53188 | .53586 |
| 0.1 | .53983 | .54380 | .54776 | .55172 | .55567 | .55962 | .56356 | .56749 | .57142 | .57535 |
| 0.2 | .57926 | .58317 | .58706 | .59095 | .59483 | .59871 | .60257 | .60642 | .61026 | .61409 |
| 0.3 | .61791 | .62172 | .62552 | .62930 | .63307 | .63683 | .64058 | .64431 | .64803 | .65173 |
| 0.4 | .65542 | .65910 | .66276 | .66640 | .67003 | .67364 | .67724 | .68082 | .68439 | .68793 |
| 0.5 | .69146 | .69497 | .69847 | .70194 | .70540 | .70884 | .71226 | .71566 | .71904 | .72240 |
| 0.6 | .72575 | .72907 | .73237 | .73565 | .73891 | .74215 | .74537 | .74857 | .75175 | .75490 |
| 0.7 | .75804 | .76115 | .76424 | .76730 | .77035 | .77337 | .77637 | .77935 | .78230 | .78524 |
| 0.8 | .78814 | .79103 | .79389 | .79673 | .79955 | .80234 | .80511 | .80785 | .81057 | .81327 |
| 0.9 | .81594 | .81859 | .82121 | .82381 | .82639 | .82894 | .83147 | .83398 | .83646 | .83891 |
| 1.0 | .84134 | .84375 | .84614 | .84849 | .85083 | .85314 | .85543 | .85769 | .85993 | .86214 |
| 1.1 | .86433 | .86650 | .86864 | .87076 | .87286 | .87493 | .87698 | .87900 | .88100 | .88298 |
| 1.2 | .88493 | .88686 | .88877 | .89065 | .89251 | .89435 | .89617 | .89796 | .89973 | .90147 |
| 1.3 | .90320 | .90490 | .90658 | .90824 | .90988 | .91149 | .91309 | .91466 | .91621 | .91774 |
| 1.4 | .91924 | .92073 | .92220 | .92364 | .92507 | .92647 | .92785 | .92922 | .93056 | .93189 |
| 1.5 | .93319 | .93448 | .93574 | .93699 | .93822 | .93943 | .94062 | .94179 | .94295 | .94408 |
| 1.6 | .94520 | .94630 | .94738 | .94845 | .94950 | .95053 | .95154 | .95254 | .95352 | .95449 |
| 1.7 | .95543 | .95637 | .95728 | .95818 | .95907 | .95994 | .96080 | .96164 | .96246 | .96327 |
| 1.8 | .96407 | .96485 | .96562 | .96638 | .96712 | .96784 | .96856 | .96926 | .96995 | .97062 |
| 1.9 | .97128 | .97193 | .97257 | .97320 | .97381 | .97441 | .97500 | .97558 | .97615 | .97670 |
| 2.0 | .97725 | .97778 | .97831 | .97882 | .97932 | .97982 | .98030 | .98077 | .98124 | .98169 |
| 2.1 | .98214 | .98257 | .98300 | .98341 | .98382 | .98422 | .98461 | .98500 | .98537 | .98574 |
| 2.2 | .98610 | .98645 | .98679 | .98713 | .98745 | .98778 | .98809 | .98840 | .98870 | .98899 |
| 2.3 | .98928 | .98956 | .98983 | .99010 | .99036 | .99061 | .99086 | .99111 | .99134 | .99158 |
| 2.4 | .99180 | .99202 | .99224 | .99245 | .99266 | .99286 | .99305 | .99324 | .99343 | .99361 |
| 2.5 | .99379 | .99396 | .99413 | .99430 | .99446 | .99461 | .99477 | .99492 | .99506 | .99520 |
| 2.6 | .99534 | .99547 | .99560 | .99573 | .99585 | .99598 | .99609 | .99621 | .99632 | .99643 |
| 2.7 | .99653 | .99664 | .99674 | .99683 | .99693 | .99702 | .99711 | .99720 | .99728 | .99736 |
| 2.8 | .99744 | .99752 | .99760 | .99767 | .99774 | .99781 | .99788 | .99795 | .99801 | .99807 |
| 2.9 | .99813 | .99819 | .99825 | .99831 | .99836 | .99841 | .99846 | .99851 | .99856 | .99861 |
| 3.0 | .99865 | .99869 | .99874 | .99878 | .99882 | .99886 | .99889 | .99893 | .99896 | .99900 |
| 3.1 | .99903 | .99906 | .99910 | .99913 | .99916 | .99918 | .99921 | .99924 | .99926 | .99929 |
| 3.2 | .99931 | .99934 | .99936 | .99938 | .99940 | .99942 | .99944 | .99946 | .99948 | .99950 |
| 3.3 | .99952 | .99953 | .99955 | .99957 | .99958 | .99960 | .99961 | .99962 | .99964 | .99965 |
| 3.4 | .99966 | .99968 | .99969 | .99970 | .99971 | .99972 | .99973 | .99974 | .99975 | .99976 |
| 3.5 | .99977 | .99978 | .99978 | .99979 | .99980 | .99981 | .99981 | .99982 | .99983 | .99983 |
| 3.6 | .99984 | .99985 | .99985 | .99986 | .99986 | .99987 | .99987 | .99988 | .99988 | .99989 |
| 3.7 | .99989 | .99990 | .99990 | .99990 | .99991 | .99991 | .99992 | .99992 | .99992 | .99992 |
| 3.8 | .99993 | .99993 | .99993 | .99994 | .99994 | .99994 | .99994 | .99995 | .99995 | .99995 |
| 3.9 | .99995 | .99995 | .99996 | .99996 | .99996 | .99996 | .99996 | .99996 | .99997 | .99997 |



**t Table**

| cum. prob | $t_{.50}$               | $t_{.75}$   | $t_{.80}$   | $t_{.85}$   | $t_{.90}$   | $t_{.95}$   | $t_{.975}$   | $t_{.99}$   | $t_{.995}$   | $t_{.999}$   | $t_{.9995}$   |
|-----------|-------------------------|-------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|--------------|---------------|
| one-tail  | <b>0.50</b>             | <b>0.25</b> | <b>0.20</b> | <b>0.15</b> | <b>0.10</b> | <b>0.05</b> | <b>0.025</b> | <b>0.01</b> | <b>0.005</b> | <b>0.001</b> | <b>0.0005</b> |
| two-tails | <b>1.00</b>             | <b>0.50</b> | <b>0.40</b> | <b>0.30</b> | <b>0.20</b> | <b>0.10</b> | <b>0.05</b>  | <b>0.02</b> | <b>0.01</b>  | <b>0.002</b> | <b>0.001</b>  |
| df        |                         |             |             |             |             |             |              |             |              |              |               |
| 1         | 0.000                   | 1.000       | 1.376       | 1.963       | 3.078       | 6.314       | 12.71        | 31.82       | 63.66        | 318.31       | 636.62        |
| 2         | 0.000                   | 0.816       | 1.061       | 1.386       | 1.886       | 2.920       | 4.303        | 6.965       | 9.925        | 22.327       | 31.599        |
| 3         | 0.000                   | 0.765       | 0.978       | 1.250       | 1.638       | 2.353       | 3.182        | 4.541       | 5.841        | 10.215       | 12.924        |
| 4         | 0.000                   | 0.741       | 0.941       | 1.190       | 1.533       | 2.132       | 2.776        | 3.747       | 4.604        | 7.173        | 8.610         |
| 5         | 0.000                   | 0.727       | 0.920       | 1.156       | 1.476       | 2.015       | 2.571        | 3.365       | 4.032        | 5.893        | 6.869         |
| 6         | 0.000                   | 0.718       | 0.906       | 1.134       | 1.440       | 1.943       | 2.447        | 3.143       | 3.707        | 5.208        | 5.959         |
| 7         | 0.000                   | 0.711       | 0.896       | 1.119       | 1.415       | 1.895       | 2.365        | 2.998       | 3.499        | 4.785        | 5.408         |
| 8         | 0.000                   | 0.706       | 0.889       | 1.108       | 1.397       | 1.860       | 2.306        | 2.896       | 3.355        | 4.501        | 5.041         |
| 9         | 0.000                   | 0.703       | 0.883       | 1.100       | 1.383       | 1.833       | 2.262        | 2.821       | 3.250        | 4.297        | 4.781         |
| 10        | 0.000                   | 0.700       | 0.879       | 1.093       | 1.372       | 1.812       | 2.228        | 2.764       | 3.169        | 4.144        | 4.587         |
| 11        | 0.000                   | 0.697       | 0.876       | 1.088       | 1.363       | 1.796       | 2.201        | 2.718       | 3.106        | 4.025        | 4.437         |
| 12        | 0.000                   | 0.695       | 0.873       | 1.083       | 1.356       | 1.782       | 2.179        | 2.681       | 3.055        | 3.930        | 4.318         |
| 13        | 0.000                   | 0.694       | 0.870       | 1.079       | 1.350       | 1.771       | 2.160        | 2.650       | 3.012        | 3.852        | 4.221         |
| 14        | 0.000                   | 0.692       | 0.868       | 1.076       | 1.345       | 1.761       | 2.145        | 2.624       | 2.977        | 3.787        | 4.140         |
| 15        | 0.000                   | 0.691       | 0.866       | 1.074       | 1.341       | 1.753       | 2.131        | 2.602       | 2.947        | 3.733        | 4.073         |
| 16        | 0.000                   | 0.690       | 0.865       | 1.071       | 1.337       | 1.746       | 2.120        | 2.583       | 2.921        | 3.686        | 4.015         |
| 17        | 0.000                   | 0.689       | 0.863       | 1.069       | 1.333       | 1.740       | 2.110        | 2.567       | 2.898        | 3.646        | 3.965         |
| 18        | 0.000                   | 0.688       | 0.862       | 1.067       | 1.330       | 1.734       | 2.101        | 2.552       | 2.878        | 3.610        | 3.922         |
| 19        | 0.000                   | 0.688       | 0.861       | 1.066       | 1.328       | 1.729       | 2.093        | 2.539       | 2.861        | 3.579        | 3.883         |
| 20        | 0.000                   | 0.687       | 0.860       | 1.064       | 1.325       | 1.725       | 2.086        | 2.528       | 2.845        | 3.552        | 3.850         |
| 21        | 0.000                   | 0.686       | 0.859       | 1.063       | 1.323       | 1.721       | 2.080        | 2.518       | 2.831        | 3.527        | 3.819         |
| 22        | 0.000                   | 0.686       | 0.858       | 1.061       | 1.321       | 1.717       | 2.074        | 2.508       | 2.819        | 3.505        | 3.792         |
| 23        | 0.000                   | 0.685       | 0.858       | 1.060       | 1.319       | 1.714       | 2.069        | 2.500       | 2.807        | 3.485        | 3.768         |
| 24        | 0.000                   | 0.685       | 0.857       | 1.059       | 1.318       | 1.711       | 2.064        | 2.492       | 2.797        | 3.467        | 3.745         |
| 25        | 0.000                   | 0.684       | 0.856       | 1.058       | 1.316       | 1.708       | 2.060        | 2.485       | 2.787        | 3.450        | 3.725         |
| 26        | 0.000                   | 0.684       | 0.856       | 1.058       | 1.315       | 1.706       | 2.056        | 2.479       | 2.779        | 3.435        | 3.707         |
| 27        | 0.000                   | 0.684       | 0.855       | 1.057       | 1.314       | 1.703       | 2.052        | 2.473       | 2.771        | 3.421        | 3.690         |
| 28        | 0.000                   | 0.683       | 0.855       | 1.056       | 1.313       | 1.701       | 2.048        | 2.467       | 2.763        | 3.408        | 3.674         |
| 29        | 0.000                   | 0.683       | 0.854       | 1.055       | 1.311       | 1.699       | 2.045        | 2.462       | 2.756        | 3.396        | 3.659         |
| 30        | 0.000                   | 0.683       | 0.854       | 1.055       | 1.310       | 1.697       | 2.042        | 2.457       | 2.750        | 3.385        | 3.646         |
| 40        | 0.000                   | 0.681       | 0.851       | 1.050       | 1.303       | 1.684       | 2.021        | 2.423       | 2.704        | 3.307        | 3.551         |
| 60        | 0.000                   | 0.679       | 0.848       | 1.045       | 1.296       | 1.671       | 2.000        | 2.390       | 2.660        | 3.232        | 3.460         |
| 80        | 0.000                   | 0.678       | 0.846       | 1.043       | 1.292       | 1.664       | 1.990        | 2.374       | 2.639        | 3.195        | 3.416         |
| 100       | 0.000                   | 0.677       | 0.845       | 1.042       | 1.290       | 1.660       | 1.984        | 2.364       | 2.626        | 3.174        | 3.390         |
| 1000      | 0.000                   | 0.675       | 0.842       | 1.037       | 1.282       | 1.646       | 1.962        | 2.330       | 2.581        | 3.098        | 3.300         |
| <b>Z</b>  | 0.000                   | 0.674       | 0.842       | 1.036       | 1.282       | 1.645       | 1.960        | 2.326       | 2.576        | 3.090        | 3.291         |
|           | 0%                      | 50%         | 60%         | 70%         | 80%         | 90%         | 95%          | 98%         | 99%          | 99.8%        | 99.9%         |
|           | <b>Confidence Level</b> |             |             |             |             |             |              |             |              |              |               |