Republic of the Philippines
Department of Education
Region III
Schools Division of Bulacan

FORTUNATO F. HALILI NATIONAL AGRICULTURAL SCHOOL

Name: __________________________________ **Grade/ Section:** ______________________
Teacher: ________________________________ **Date:** ________________________

LEARNING ACTIVITY SHEET 3
STATISTICS AND PROBABILITY

I. Introduction:

The normal distribution is just one of the distributions to be discussed in this course. It is also considered as the most important distribution in Statistics because it fits many real-life situations. This lesson will bring us a deeper understanding of the normal distribution and its characteristics.

II. Learning Competency:

- illustrate a normal random variable and its characteristics.
- identify regions under the normal curve that correspond to different standard normal values.
- convert a normal random variable to a standard normal variable and vice versa; and
- compute probabilities and percentiles using the standard normal distribution.

III. Discussion:

The Normal Distribution and Its Properties

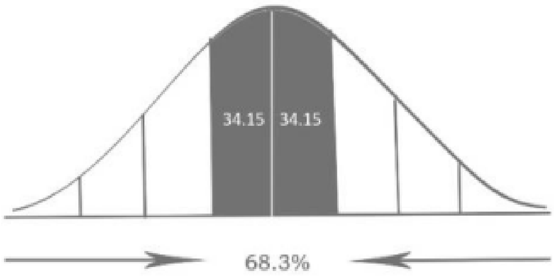
To give us a deeper understanding of the concept of the normal distribution, let us learn more about its properties.

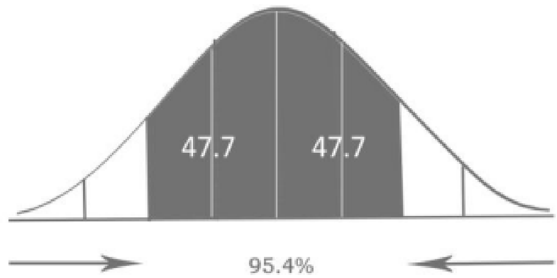
The following are the properties that can be observed from the graph of a normal distribution, also known as Gaussian distribution.

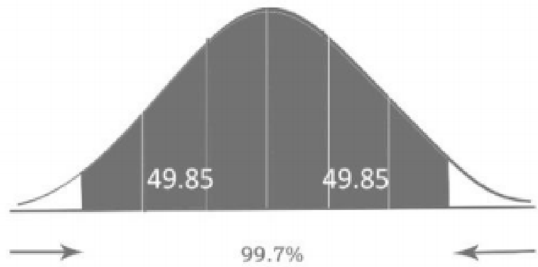
1. The graph is a continuous curve and has a domain $-\infty < X < \infty$.
   • This means that X may increase or decrease without bound
2. The graph is asymptotic to the x-axis. The value of the variable gets closer and closer but will never be equal to 0.
   • As the x gets larger and larger in the positive direction, the tail of the curve approaches but will never touch the horizontal axis. The same thing when the x gets larger and larger in the negative direction.

3. The highest point on the curve occurs at $x = \mu$ (mean).
   • The mean (μ) indicates the highest peak of the curve and is found at the center.
   • Take note that the mean is denoted by this symbol μ and the standard deviation is denoted by this symbol σ.
   • The median and mode of the distribution are also found at the center of the graph. This indicates that in a normal distribution, the mean, median and mode are equal.

4. The curve is symmetrical about the mean.
   • This means that the curve will have balanced proportions when cut in halves and the area under the curve to the right of mean (50%) is equal to the area under the curve to the left of the mean (50%).
5. The total area in the normal distribution under the curve is equal to 1.
   • Since the mean divides the curve into halves, 50% of the area is to the right and 50% to its left having a total of 100% or 1.
6. In general, the graph of a normal distribution is a bell-shaped curve with two inflection points, one on the left and another on the right. Inflection points are the points that mark the change in the curve's concavity.
   • Inflection point is the point at which a change in the direction of curve at mean minus standard deviation and mean plus standard deviation.
   • Note that each inflection point of the normal curve is one standard deviation away from the mean.
7. Every normal curve corresponds to the "empirical rule" (also called the 68 -95 - 99.7% rule):
   • about 68.3% of the area under the curve falls within 1 standard deviation of the mean
   • about 95.4% of the area under the curve falls within 2 standard deviations of the mean
   • about 99.7% of the area under the curve falls within 3 standard deviations of the mean.

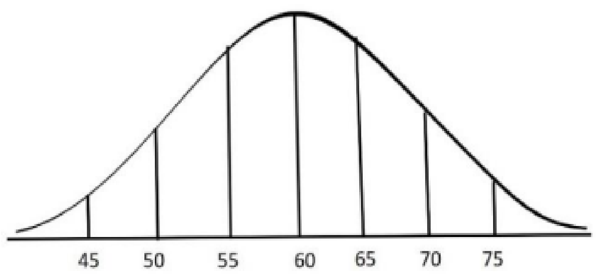






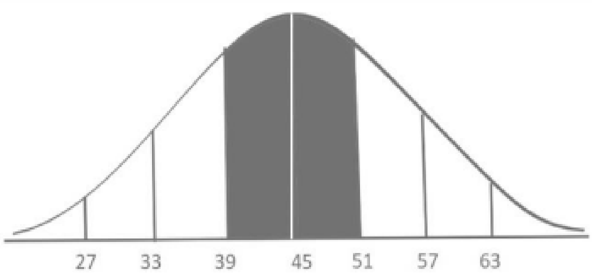
Consider the following examples:

1. Suppose the mean is 60 and the standard deviation is 5, sketch a normal curve for the distribution. This is how it would look like.



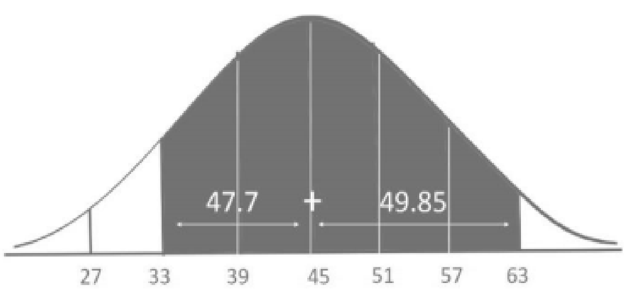
2. A continuous random variable X is normally distributed with a mean of 45 and standard deviation of 6. Illustrate a normal curve and find the probability of the following:

a. P (39 < X < 51) = 68.3%

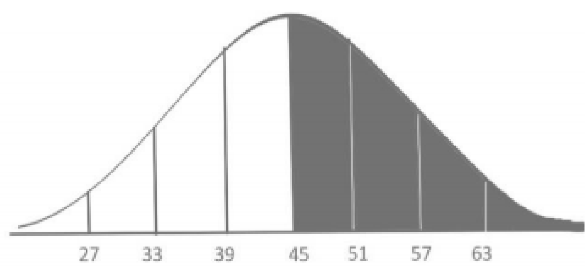


**Since the area covered is 1 standard of the deviation to the left and to the right.*

b. P (33 < X < 63) = 97.55%

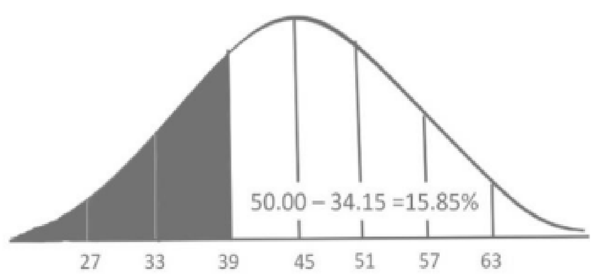


c. P (X > 45) = 50%



** Since the area covered is half curve.*

d. P (X < 39) = 15.85%



The Standard Normal Distribution

As mentioned earlier, normal variable is standardized by setting the mean to 0 and standard deviation to 1. This is for the purpose of simplifying the process in approximating areas for normal curves. As shown below is the formula used to manually compute the approximate area.

$$f(z) = \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}}$$

However, this formula is seldom used because a table was created to summarize the approximate areas under the standard normal curve and to further simplify the process. This table of probabilities is known as the z- table.

The Z - Table

Let us get a closer look at the z-table. The outermost column and row represent the z-values. The first two digits of the z-value are found in the leftmost column and the last digit (hundredth place) is found on the first row.

Suppose the z-score is equal to 1.85, locate the first two digits 1.8 in the leftmost column and the last digit, .05, can be located at the first row. Then find their intersection which gives the corresponding area. Therefore, given z = 1.85, the area is equal to 0.9678.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817

Other examples are as follow:

1. Find the area that corresponds to z = 2.67 Answer: 0.9962

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981

2. Find the area that corresponds to z = 1.29 Answer: 0.9015

3. Find the area that corresponds to z = 3 Answer: 0.9987

4. Find the area that corresponds to z = - 0.64 Answer: 0.2611

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-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

5. Find the area that corresponds to z = - 2.33 Answer: 0.0099

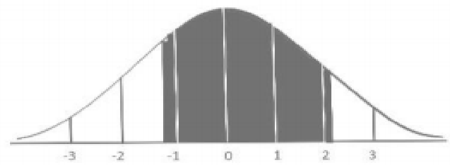
Note: The z-table used is the Cumulative Distribution Function (CDF) of the Standard Normal Curve. Refer to the attachment on pages 19 and 20.

Now that you already know how to use the z-table to find the corresponding area for the z-score, let us identify the regions under the nomal curve that corresponds to different standard normal values. In order to find the regions, a probability notation is used.

The probability notation P(a < Z < b) indicates that the z-value is between a and b, P(Z > a) means z-value is above a and P(Z < a) means z-value is below a. It would not matter whether we are considering P(Z < a) or P(Z ≤ a) or P(Z > a) or P(Z ≥ a). To illustrate, let us consider these examples:

1. Find the proportion of the area between z = -1.25 and 2.19, this can be expressed as P(-1.25 < Z < 2.19), read as the probability that Z is greater than -1.25 but less than 2.19.

   Solution:

   STEP 1: Draw a normal curve and locate the z - scores and shade.

   STEP 2: Locate the corresponding area of the z - scores in the z-table.

   z = -1.25 has a corresponding area of 0.1056

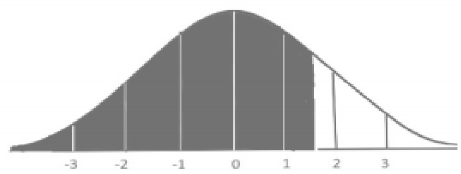
   z = 2.19 has a corresponding area of 0.9857

   STEP 3: If you are looking for the area between two z - scores, simply subtract the corresponding areas to arrive at the answer. Therefore, 0.9857 - 0.1056 = 0.8801 and the P(-1.25 < Z < 2.19) = 0.8801 or 88.01%

2. Compute the probability using the standard normal curve.

   a. P(Z < 1.67) = ____________

   Solution:

   STEP 1: Draw a normal curve and locate the z - score and shade.

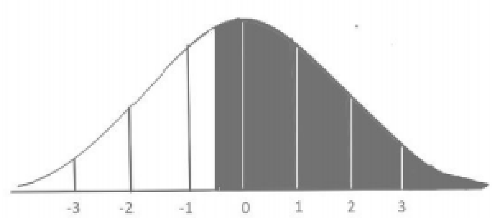
   STEP 2: Locate the corresponding area of the z - score in the z-table.

   z = 1.67 has a corresponding area of 0.9525

   STEP 3: If you are looking for a less than area, the area in the table is the answer, therefore the P(Z < 1.67) = 0.9525 or 95.25%.

   b. P(Z > -0.65) = ____________

   Solution:

   STEP 1: Draw a normal curve and locate the z - score and shade.

   STEP 2: Locate the corresponding area of the z - score in the z-table.

   z = -0.65 has a corresponding area of 0.2578

   STEP 3: If you are looking for a greater than area, the area in the table is subtracted from 1, therefore, 1.0000 – 0.2578 = 0.7422 , and the P(Z > -0.65) = 0.7422 or 74.22%

The Z- Score

The z-score is an essential component in standard normal distribution. This allows us to describe a given set of data by finding the z-scores. This leads us to a question of how z-scores are identified?

Given a normal random variable X with mean (μ) and standrad deviation (σ), each value of x of the variable can be transformed into z-scores using the formula,

$$z = \frac{x - \mu}{\sigma}$$

where z = z- score or standard score

x = observed value

μ = mean

σ = standard deviation

To illustrate how the value of x can be converted in z-score, here are some examples.

1. A random variable X has a mean of 6 and a standard deviation of 2. Find the corresponding z-score for x = 11.

Given:	x = 11	μ = 6	σ = 2

Solution: $z = \frac{x-\mu}{\sigma}$ *Step 1: Write the formula.*

$= \frac{11-6}{2}$ *Step 2: Substitute the given values.*

$= \frac{5}{2}$ *Step 3: Perform the operations.*

z = 2.5 *Step 4: Write the corresponding z-score.*

2.

Given:	x = 20	μ = 12	σ = 3

Solution: $z = \frac{x-\mu}{\sigma}$ *Step 1: Write the formula.*

$= \frac{20-12}{3}$ *Step 2: Substitute the given values.*

$= \frac{8}{3}$ or 2.666666666667 *Step 3: Perform the operations.*

z = 2.67 *Step 4: Write the corresponding z-score.*

3.

Given:	x = 18	μ = 28	σ = 5

Solution: $z = \frac{x-\mu}{\sigma}$ *Step 1: Write the formula.*

$= \frac{18-28}{5}$ *Step 2: Substitute the given values.*

$= \frac{-10}{5}$ *Step 3: Perform the operations.*

z = -2 *Step 4: Write the corresponding z-score.*

4. The scores in the summative test of 11- STEM B are normally distributed with a mean of 65 and a standard deviation of 12. Find the probability that some students got a score below 40.
Solution:

STEP 1: Convert the normal value in z-score.

Given: x = 40 μ = 65 σ = 12

Solution: $z = \frac{x-\mu}{\sigma}$

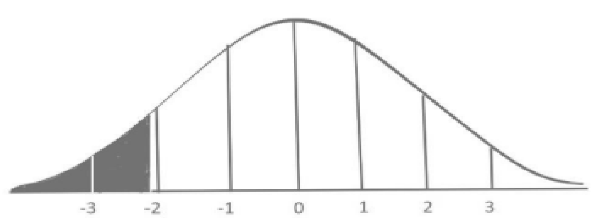
$= \frac{40-65}{12}$

$= \frac{-25}{12}$

z = -2.08

Therefore, the P(X < 40) = P(Z < -2.08)

STEP 2: Draw a normal curve and locate the z - score and shade.



STEP 3: Locate the corresponding area of the z - score in the z-table.

z = -2.08 has a corresponding area of 0.0188

STEP 4: If you are looking for a less than area, the area in the table is the answer, therefore, the P(Z < -2.08) = 0.0188 or 1.88%.

5. The height (in meters) of grade 11 students in section A follows a normal distribution with the mean 1.6 and a standard deviation of 0.3. Find the pobability that students chosen at random has a height greater than 1.75.
Solution:

STEP 1: Convert the normal value in z - score.

Given: x = 1.75 μ = 1.6 σ = .3

Solution: $z = \frac{x-\mu}{\sigma}$

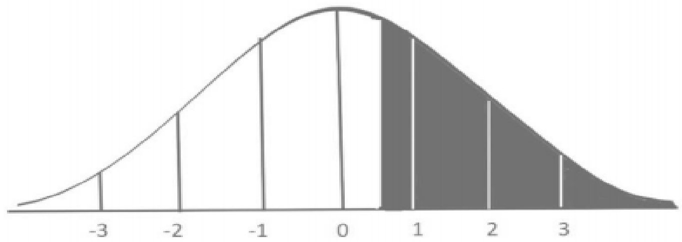
$= \frac{1.75 - 1.6}{.3}$

$= \frac{.15}{.3}$

z = 0.5

Therefore, the P(X > 1.75) = P(Z > 0.5)

STEP 2: Draw a normal curve and locate the z - score and shade.



STEP 3: Locate the corresponding area of the z - score in the z-table.

z = 0.5 has a corresponding area of 0.6915

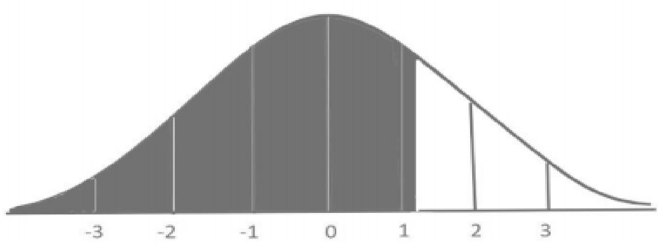
STEP 4: If you are looking for a greater than area, the area in the table is subtracted from 1, therefore, 1.0000 – 0.6915 = 0.3085 , and the P(Z > 0.5) = 0.3085 or 30.85%

The Percentile

A percentile is a measure used in statistics indicating the value below which a given percentage of observations in a group of observations fall.

Imagine you took a standardized test and you scored 91 at the 89th percentile. This means that 89% of the examiners scored lower than 91 and 11% scored higher than 91. This explains that 89th percentile is located where 89% of the total population lies below and 11% lies above that point. To illustrate the 89th percentile of the normal curve here are the steps:

1. Express the given percentage as probability, remember 89% is the same as 0.8900.
2. Using the z-table (Cumulative Distribution Function (CDF) of the Standard Normal Curve), locate the area of 0.8900.
3. There is no area corresponding exactly to 0.8900. It is between of 0.8888 with a corresponding z - score of 1.22 and 0.8907 with a corresponding z - score of 1.23. The nearest value to 0.8900 is 0.8888 and therefore, the distribution lies below z = 1.22.
4. Construct a normal curve and shade the region to the left of 1.22.



IV. Activities:

ACTIVITY 1.1

Directions: Read the following statements carefully. Write **ND** if the statement describes a characteristic of a normal distribution, and **NND** if it does not describe a characteristic of a normal distribution. Write your answers on a separate sheet of paper.

1. The curve of the distribution is bell-shaped.
2. In a normal distribution, the mean, median and mode are of equal values.
3. The normal curve gradually gets closer and closer to 0 on one side.
4. The curve is symmetrical about the mean.
5. The distance between the two inflection points of the normal curve is equal to the value of the mean.
6. A normal distribution has a mean that is also equal to the standard deviation.
7. The two parameters of the normal distribution are the mean and the standard deviation.
8. The normal curve can be described as asymptotic.

9. Two standard deviations away from the left and right of the mean is equal to 68.3%.
10. The area under the curve bounded by the x-axis is equal to 1.

ACTIVITY 1.2

Directions: Read the instructions given and write your answers on a separate sheet of paper.

A. Complete the table by converting the given values into z-scores. Then find the corresponding area using the z-table.

Given			Z- score	Approximate area
1. $x = 28$	$\mu = 16$	$\sigma = 5$		
2. $x = 68$	$\mu = 75$	$\sigma = 5$		
3. $x = 1.72$	$\mu = 1.6$	$\sigma = 0.2$		
4. $x = 24$	$\mu = 38$	$\sigma = 8$		
5. $x = 50$	$\mu = 45$	$\sigma = 6$		

B. Compute the following probabilities using the standard normal curve. Construct a curve then shade the region corresponding to the area.
1. $P(Z > -1.53)$
2. $P(Z < 2.89)$
3. $P(-1.65 < Z < 2.15)$

ACTIVITY 1.3

A. Multiple Choice
Directions: Choose the best answer. Write the chosen letter on a separate sheet of paper.

1. Which of the following denotes the standard normal distribution?
A. A B. X
C. Y D. Z

2. Which of the following describes the standard normal distribution?
A. has a mean of zero (0) and a standard deviation of 1.
B. has a mean of 1 and a variance of zero (0).
C. has an area equal to 0.5.
D. cannot be used to approximate discrete probability distributions.

3. What is the formula in finding the z-score?
A. $z = \frac{x-\mu}{\sigma}$
B. $z = \frac{\mu-\sigma}{x}$
C. $z = \frac{\sigma-\mu}{x}$
D. $z = \frac{x-\sigma}{\mu}$

4. A random variable X has a mean of 4 and a standard deviation of 2. What is the corresponding z-score for x = 7?
A. 0.5 B. 1.0
C. 1.5 D. 2

5. What is the area if the z - score given is -1.83?
A. 0.0344 B. 0.0336
C. 0.0329 D. 0.0322

6. What is the z-value if the area is 0.9608?
A. -1.76 B. -1.77
C. 1.76 D. 1.77

7. Using the standard normal curve, what is the approximate area of $P(1.63 < Z < 2.79)$?
   A. 0.0049 B. 0.0490
   C. 0.9484 D. 0.9974
8. The weights (in kg) of 11-STEM B follow a normal distribution and has a mean of 50 and a standard deviation of 5. How many students have weights greater than 57?
   A. 1.4 B. 0.0808
   C. 0.9192 D. 0.9332
9. What is the value of 97.5th percentile in a standard normal distribution?
   A. -1.96 B. -1.97
   C. 1.96 D. 1.97
10. What is the value of 67th percentile in a standard normal distribution?
   A. -0.43 B. -0.44
   C. 0.43 D. 0.44

B. Probability of Standard Normal Distribution

Directions: Compute the following probabilities using the standard normal curve. On your answer sheets, construct a curve then shade the region corresponding to the area.

1. $P(Z > 1.65)$
2. $P(Z < 2.36)$

V. Reflection:

____
____
____
____
____

VI. References:

Bantay, Liza B. ADM Module. Department of Education-CALABARZON.

Cumulative Distribution Function (CDF) of the Standard Normal Curve

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

Cumulative Distribution Function (CDF) of the Standard Normal Curve

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998