LEARNING AS ONE NATION

Expanded Project

Stat & Prob_12

SHS LEARNING ACTIVITY

Name: _____ **Score/Mark:** _____

Grade and Section: _____ **Date:** _____

Strand: ☐ STEM ☐ ABM ☐ HUMSS ☐ ICT (*TVL Track*)

Subject: ***Statistics & Probability***

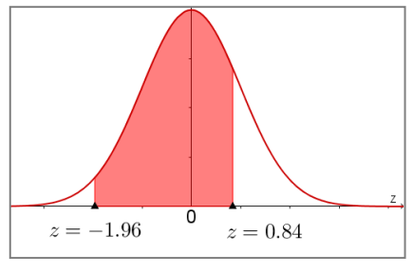
Type of Activity: ☐ Concept Notes ☐ Skills: Exercise/Drill ☐ Illustration ☐ Performance Task ☐ Essay/Report ☐ Others: _____

Activity Title: Area under the Standard Normal Curve II

Learning Target: To identify the regions under a standard normal curve.
To compute for probabilities using the standard normal distribution table.

References: *(Author, Title, Pages)*
1) Walpole, R. E. et al. "Probability and Statistics for Engineers & Scientists, 9th Ed", pp. 192-203;
2) L.A. Sajulga, CVIF Learning Activities

Example 3: Find $P(-1.96 < z < 0.84)$.



Solution: The area between $z = -1.96$ and $z = 0.84$ is equivalent to the area to the left of $z = 0.84$ minus the area to the left of $z = -1.96$. Hence,

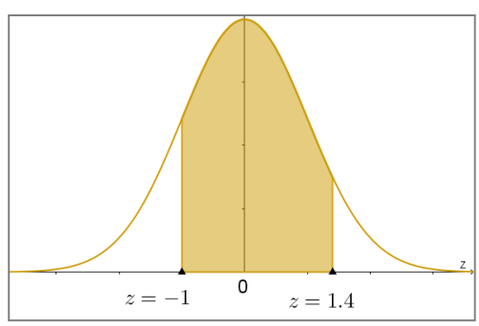
$$\Rightarrow P(-1.96 < z < 0.84) = P(z < 0.84) - P(z < -1.96)$$
$$= 0.79955 - 0.0250$$
$$= 0.7746 = \boxed{\mathbf{77.46\%}}\ .$$

Example 4: Suppose a random variable X has a normal distribution where $\mu = 50$ and $\sigma = 10$, compute the probability that X takes a value between $x = 40$ and $x = 64$.

Solution: The corresponding z values for $x_1 = 40$ and $x_2 = 64$ are:

$$z_1 = \frac{x_1 - \mu}{\sigma} = \frac{40-50}{10} = \frac{-10}{10} = -1$$

$$z_2 = \frac{x_2 - \mu}{\sigma} = \frac{64-50}{10} = \frac{14}{10} = 1.4$$



Therefore,

$$P(40 < X < 64) = P(-1 < Z < 1.4)$$
$$= P(Z < 1.4) - P(Z < -1)$$
$$= 0.9192 - 0.1587$$
$$= 0.7605 = \boxed{\mathbf{76.05\%}}$$

Exercises:

1. Given that X has a normal distribution with $\mu = 300$ and $\sigma = 50$, find $P(305 < X < 364)$ then illustrate.

2. A research scientist reported that laboratory mice can live an average of 42 months given that their diet is strictly controlled and supplemented with proteins and vitamins. Assuming that their lifetime is normally distributed and the standard deviation is 6.4 months, find the probability that a certain mouse will live:
   a) more than 34 months;
   b) less than 38 months;
   c) between 40 and 48 months.