Learning Journal Unit 7

Godfrey Ouma

University of the People

MATH 1280: Introduction to Statistics

Esther Pearson

October 26, 2023

Learning Journal Unit 7

We are given a normally distributed random variable X with μ= 100 and σ= 15.

1. **Find P ($X > 120$).**

$$(X > 120) = \text{normalcdf}(120, 1EE, 100, 15) \approx 0.0912$$

2. **Find k such as P(X<k) = 0.98. Interpret your result.**

   To find k such as $P(X < k) = 0.98$, we need to find that the Z-score corresponding to a probability of 0.98 using a standard normal table, which is approximately 2.05.

$$z = \frac{(k - \mu)}{\sigma}$$

   Therefore, we can rewrite the above equation as:

$$\frac{(k - \mu)}{\sigma} \approx 2.05$$

   Multiplying both sides of the equation by σ and adding μ to both sides, we get:

$$k = \mu + \sigma * 2.05 = 130.75$$

   Interpretation:

   The value of k, which is approximately 2.05, is the cutoff point such that the probability of X being less than k is 0.98. This means that about 98% of the data falls below this value, and only about 2% of the data lies above it. For instance, if X represents mass of students in pounds, then a mass 2.05 pounds or less would be considered to be in the 98th percentile. This means that 98% of students are weighing less than 2.05 pounds. The value of k can also be interpreted as 2.05 standard deviations (2.05σ) above or to the right of the mean $\mu = 15$.

3. **Find the two values where the middle 50% of the distribution of X lie.**

$$1 - 0.50 = 0.50$$

$The\ tails\ of\ the\ graph\ of\ the\ normal\ distribution\ each\ have\ an\ area\ of$ 0.25.

$$Find\ k1, the\ 25th\ percentile, and\ k2, the\ 75th\ percentile\ (0.25\ +\ 0.50 = 0.75).$$

$$k1\ =\ invNorm(0.25,100,15)\ \approx 89.88$$

$$k2\ =\ invNorm(0.75,100,15)\ \approx 110.12$$

Therefore, the middle 50% of the distribution of X lies between 89.88 and 110.12.