

Answer on Question #51425 – Math – Statistics and Probability

The president of Doerman Distributors, Inc., believes that 31% of the firm's orders come from first-time customers. A random sample of 101 orders will be used to estimate the proportion of first-time customers.

1. What is the probability that the sample proportion will be between 0.21 and 0.41?

7. What is the probability that the sample proportion will be between 0.26 and 0.36?

Solution:

1. The probability that the sample proportion will be between 0.21 and 0.41 is

$$P(0.21 < X < 0.41) = P(X < 0.41) - P(X < 0.21)$$

$$z\text{-score for } 0.21 \text{ is } \frac{0.21 - 0.31}{\sqrt{\frac{0.31(1-0.31)}{101}}} = -2.17298$$

$$z\text{-score for } 0.41 \text{ is } \frac{0.41 - 0.31}{\sqrt{\frac{0.31(1-0.31)}{101}}} = 2.17298$$

The values on the z-table

$$z(-2.17) = 0.0150$$

$$z(2.17) = 0.9846$$

So, the probability that the sample proportion will be between 0.21 and 0.41 is

$$P(0.21 < X < 0.41) = P(X < 0.41) - P(X < 0.21) = 0.9846 - 0.0150 = 0.9696.$$

7. The probability that the sample proportion will be between 0.26 and 0.46 is

$$P(0.26 < X < 0.46) = P(X < 0.46) - P(X < 0.26)$$

$$z\text{-score for } 0.26 \text{ is } \frac{0.26 - 0.31}{\sqrt{\frac{0.31(1-0.31)}{101}}} = -1.08649$$

$$z\text{-score for } 0.46 \text{ is } \frac{0.46 - 0.31}{\sqrt{\frac{0.31(1-0.31)}{101}}} = 1.08649$$

The values on the z-table

$$z(-1.09) = 0.1379$$

$$z(1.09) = 0.8621$$

So the probability that the sample proportion will be between 0.26 and 0.46 is

$$P(0.26 < X < 0.46) = P(X < 0.46) - P(X < 0.26) = 0.8621 - 0.1379 = 0.7242.$$