Answer on Question #48214 – Math – Statistics and Probability

According to a government study among adults in the 25- to 34-year age group, the mean amount spent per year on reading and entertainment is $1,994. Assume that the distribution of the amounts spent follows the normal distribution with a standard deviation of $450.

a) What percent of the adults spend between $2,500 and $3,000 per year on reading and entertainment?

b) What percent spend less than $1,000 per year on reading and entertainment?

Solution

$$\mu = 1994; \; \sigma = 450.$$

a) We need to find

$$P(X_1 < X < X_2) = P(2500 < X < 3000).$$

$$P(2500 < X < 3000) = P(X < 3000) - P(X < 2500).$$

$$z_1 = \frac{X_1 - \mu}{\sigma} = \frac{3000 - 1994}{450} = 2.34.$$

$$z_2 = \frac{X_2 - \mu}{\sigma} = \frac{2500 - 1994}{450} = 1.12.$$

$$P(X < 3000) = P(z < 2.34) = 0.9904.$$

$$P(X < 2500) = P(z < 1.12) = 0.8686.$$

$$P(2500 < X < 3000) = 0.9904 - 0.8686 = 0.1218.$$

The percent of the adults spend between $2,500 and $3,000 per year on reading and entertainment is 12.18%.

b) We need to find

$$P(X < 1000).$$

$$z_0 = \frac{X_0 - \mu}{\sigma} = \frac{1000 - 1994}{450} = -2.21.$$

$$P(X < 1000) = P(z < -2.21) = 0.0136.$$

The percent spend less than $1,000 per year on reading and entertainment is 1.36%.