

Answer on Question #54884 – Math – Statistics and Probability

A tire manufacturer believes that the tread life of its snow tires can be described by a normal model with a mean of 32,000 miles and a standard deviation of 2500 miles.

- a) if you buy one of these tires, would it be reasonable for you to hope it will last 40,000 miles? explain
- b) approx. what fraction of these tires can be expected to last less than 30,000 miles?
- c) approx. what fraction of these tires can be expected to last between 30,000 and 35,000 miles?

Solution

a) Mean = 32,000 miles

SD = 2,500 miles

x = 40,000 miles

$$z = \frac{x - \text{mean}}{SD} = \frac{40,000 - 32,000}{2,500} = 3.2.$$

From a normal distribution table

$$P(z < 3.2) = 0.9993$$

so

$$P(3.2 < z) = 1 - 0.9993 = 0.0007 = 0.07\%$$

Thus, it is not reasonable to hope for the set of these tires last for 40,000 miles (or more). The probability for this to occur is just too small.

b) x = 30,000 miles

$$z = \frac{x - \text{mean}}{SD} = \frac{30,000 - 32,000}{2,500} = -0.8.$$

$$P(z < -0.8) = 0.2119$$

Thus, approximately 21.19% of these tires can be expected to last less than 30,000 miles.

c) We have already calculated $P(z < -0.8) = 0.2119$, thus let's focus on x = 35,000 miles:

$$z = \frac{(35,000 - 32,000)}{2,500} = 1.2$$

$$P(z < 1.2) = 0.8849.$$

So,

$$P(-0.8 < z < 1.2) = P(z < 1.2) - P(z < -0.8) = 0.8849 - 0.2119 = 0.6730.$$

Thus, approximately 67.3% of these tires are expected to last between 30,000 and 35,000 miles.