

Answer on Question #52392 – Math – Statistics and Probability

In company XYZ, 30 percent of the workers take public transportation daily to go to work.

$$p = 0.3.$$

$$P(X = k) = \frac{n!}{k!(n - k)!} p^k (1 - p)^{n - k}$$

1. In a sample of 10 workers, what is the probability that 3 workers take public transportation to work daily?

- a. .900
- b. .267
- c. .100
- d. 1.20

Solution

Choose the binomial distribution with parameters $(n, p) = (10, 0.3)$ and

$$P(X = 3) = \frac{10!}{3!(10 - 3)!} 0.3^3 (1 - 0.3)^{10 - 3} = 0.267.$$

Answer: b. .267.

2. In a sample of 10 workers, what is the probability that at least 3 workers take public transportation to work daily?

- a. .767
- b. .383
- c. .617
- d. .100

Solution

Choose the binomial distribution with parameters $(n, p) = (10, 0.3)$ and probability of complement is calculated by

$$P(X \geq 3) = 1 - P(X < 3).$$

By addition rule for probability of mutually exclusive events,

$P(X < 3) = P(X = 0) + P(X = 1) + P(X = 2)$, where

$$P(X = 0) = \frac{10!}{0!(10 - 0)!} 0.3^0 (1 - 0.3)^{10 - 0} = 0.0282.$$

$$P(X = 1) = \frac{10!}{1!(10-1)!} 0.3^1 (1-0.3)^{10-1} = 0.1211$$

$$P(X = 2) = \frac{10!}{2!(10-2)!} 0.3^2 (1-0.3)^{10-2} = 0.2335.$$

Therefore,

$$P(X \geq 3) = 1 - 0.0282 - 0.1211 - 0.2335 = 0.617.$$

Answer: c. .617.

3. In a sample of 10 workers, what is the probability that, at most, 2 workers take public transportation to work daily?

- a. .233
- b. .121
- c. .383
- d. .149

Solution

Probability of complement is given by

$$P(X \leq 2) = 1 - P(X \geq 3) = 1 - 0.617 = 0.383.$$

Answer: c. .383.