

Answer on Question #82320 – Math — Statistics and Probability

Question

A recent survey revealed that 60% of drivers use their seat belts. A sample of 10 drivers on a major road is selected. Calculate the probability that no more than 3 drivers are wearing seat belts

Solution

Let X be the number of drivers that are wearing seat belts (among 10 selected drivers). Then we need to calculate $P(X \leq 3)$.

We have

$$P(X \leq 3) = P(X = 0) + P(X = 1) + P(X = 2) + P(X = 3),$$
$$P(X = k) = \binom{10}{k} p^k (1 - p)^{10 - k},$$

where $p = 0.6, k = 0, 1, 2, 3$.

We get

$$P(X \leq 3) = 0.4^{10} + 10 * 0.6^1 * 0.4^9 + \frac{10 * 9}{2} 0.6^2 * 0.4^8 + \frac{10 * 9 * 8}{2 * 3} 0.6^3 * 0.4^7$$
$$= 0.05476.$$

Answer: 0.05476.