Answer on Question #72623 – Math – Statistics and Probability

Question

A manufacturing company uses an acceptance scheme on items from a production line before they are shipped. The plan is a two-stage one. Boxes of 25 items are readied for shipment, and a sample of 3 items is tested for defectives. If any defectives are found, the entire box is sent back for 100% screening. If no defectives are found, the box is shipped.

(a) What is the probability that a box containing 3 defectives will be shipped?

(b) What is the probability that a box containing only 1 defective will be sent back for screening?

Solution

(a) In this case we have a box of 25 items containing 3 defectives and 22 quality items. This box will be shipped if a sample of 3 items has no defectives. It occurs with probability

$$P(A) = \frac{\binom{22}{3}}{\binom{25}{3}} = \frac{20 \cdot 21 \cdot 22}{23 \cdot 24 \cdot 25} \approx 0.67$$

(b) In this case we have a box of 25 items containing 1 defective and 24 quality items. This box will be sent back for screening if a sample of 3 items has 1 defective and 2 quality items. It occurs with probability

$$P(B) = \frac{1 \cdot \binom{24}{2}}{\binom{25}{3}} = \frac{3}{25} = 0.12$$

Answer: (a) ≈ 0.67; **(b)** 0.12.