Answer on Question #83342 – Math – Statistics and Probability

It is known that only 60% of a defective computer can be repaired. A sample of eight computers is selected randomly. Find the probability of:

Question

(a) At most, three computers can be repaired

Solution

For the binomial distribution,

$$P(x = k) = C_n^k p^k q^{n-k}$$

The probability of success is

$$p = 0.6$$

probability of failure is

$$q = 1 - p = 0.4$$

the number of trials is

$$n = 8$$

Thus, we have to find

$$P(x \leq 3) = P(0) + P(1) + P(2) + P(3)$$

$$P(0) = q^n = 0.4^8 = 0.00066$$

$$P(1) = \frac{8!}{1!\,7!} \cdot 0.6^1 \cdot 0.4^7 = 0.00786$$

$$P(2) = \frac{8!}{2!\,6!} \cdot 0.6^2 \cdot 0.4^6 = 0.04129$$

$$P(3) = \frac{8!}{3!\,5!} \cdot 0.6^3 \cdot 0.4^5 = \frac{6 \cdot 7 \cdot 8}{6} \cdot 0.6^3 \cdot 0.4^5 = 0.12386$$

$$P(x \le 3) = 0.00066 + 0.00786 + 0.04129 + 0.12386 = 0.17367$$

Answer: $P(x \le 3)$ =0.17367.

Question

(b) Five or less can be repaired

Solution

$$P(x \le 5) = P(x \le 3) + P(4) + P(5)$$

$$P(4) = \frac{8!}{4!\,4!} \cdot 0.6^4 \cdot 0.4^4 = \frac{5 \cdot 6 \cdot 7 \cdot 8}{2 \cdot 3 \cdot 4} \cdot 0.6^4 \cdot 0.4^4 = 0.23224$$

$$P(5) = \frac{8!}{3!\,5!} \cdot 0.6^5 \cdot 0.4^3 = 0.27869$$

$$P(x \le 5) = 0.17367 + 0.23224 + 0.27869 = 0.68460$$

Answer: $P(x \le 5) = 0.68460$.

Question

(c) None can be repaired

Solution

$$P(0) = q^n = 0.4^8 = 0.00066$$

Answer: $P(0) = 0.00066$.