

Answer on Question #70020 – Math – Statistics and Probability

QUESTION

(a) It is noted that 8% of Kaplan students are left handed. If 20 (TWENTY) students are randomly selected, calculate the

- i. probability that none of them are left-handed, (2 marks)
- ii. probability that at most 2 are left-handed, (3 marks)
- iii. standard deviation for the number of left-handed students (2 marks)

(b) If 50 (FIFTY) classes of 20 (TWENTY) students are randomly selected, what is the probability that 10 (TEN) classes have no left-handed students?

SOLUTION

(a)

$$\text{i. } P(X = 0) = C_{20}^0 0.08^0 0.92^{20} = 0.92^{20} \approx 0.1887.$$

$$\text{ii. } P(X \leq 2) = P(X = 0) + P(X = 1) + P(X = 2) = C_{20}^0 0.08^0 0.92^{20} + C_{20}^1 0.08^1 0.92^{19} + C_{20}^2 0.08^2 0.92^{18} = 0.7879.$$

$$\text{iii. } \sigma = \sqrt{np(1-p)} = \sqrt{20 * 0.08 * 0.92} \approx 1.2133.$$

(b)

$$P(\text{no one in a class is left-handed}) = 0.92^{20} = 0.1887$$

$$P(\text{at least one in a class is left-handed}) = 1 - 0.1887 = 0.8113$$

$$\begin{aligned} P(\text{10 classes have no left-handed students}) &= \\ &= C_{50}^{10} * 0.1887^{10} * 0.8113^{40} = 0.1370. \end{aligned}$$