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Roll NO: 53

Panel: A

Tutorial-5 (PS)

Ans)

Probability of defective bulb = p

$$= \frac{20}{100} = \frac{1}{5}$$

Total no. of bolts = $n = 900$

$$\begin{aligned}\text{Mean} &= np \\ &= 900 \times \frac{1}{5}\end{aligned}$$

$$\therefore \text{Mean} = 180$$

$$\therefore \text{Standard Deviation} = \sqrt{npq}$$

$$= \sqrt{np(1-p)}$$

$$= \sqrt{900 \times \frac{1}{5} \times \left(1 - \frac{1}{5}\right)}$$

$$= \sqrt{900 \times \frac{1}{5} \times \frac{4}{5}}$$

$$= \sqrt{144}$$

$$= 12$$

Q2

Binomial Variable

$$\text{mean} = 6$$

$$\text{Variance} = 2$$

$$P(x \geq 2)$$

$$np = 6$$

$$npq = 2$$

$$\therefore q = \frac{1}{3} \quad p = \frac{2}{3} \quad n = 9$$

$$\therefore P(x \geq 2) = 1 - (P(x=0) + P(x=1))$$

$$= 1 - \left[{}^9C_0 \left(\frac{2}{3}\right)^9 + {}^9C_1 \left(\frac{2}{3}\right)^8 \left(\frac{1}{3}\right)^1 \right]$$

$$= 1 - \left[\left(\frac{2}{3}\right)^9 + 9 \cdot \left(\frac{1}{3}\right)^9 2^8 \right]$$

$$= 1 - \left(\frac{1}{3}\right)^9 \{ 2^9 + 9(2^8) \}$$

$$= 1 - (0.000046) [8512 + 2304]$$

$$= 1 - 0.129$$

$$\approx 0.88$$

Q3

X binomial distribution with n and $p = \frac{1}{2}$
if $P(x=6)$, $P(x=8)$ then $n = ?$

Given ${}^nC_6 \left(\frac{1}{2}\right)^{n-6} \left(\frac{1}{2}\right)^6 = {}^nC_8 \left(\frac{1}{2}\right)^{n-8} \left(\frac{1}{2}\right)^8$

$${}^nC_6 \left(\frac{1}{2}\right)^n = {}^nC_8 \left(\frac{1}{2}\right)^n$$

$$nC_6 = nC_8$$

By property, $n = 6 + 8 = 14$

Q4

$$np = \frac{5}{4}$$

$$npq = \frac{15}{16}$$

$$\therefore q = \frac{15 \times 4}{16 \times 5} = \frac{3}{4} \quad p = \frac{1}{4} \quad n = 5$$

Probability of success p in a single trial = $\frac{1}{4}$ ($p = \frac{1}{4}$)

Q5

$$7H \& 3T$$

$$= \frac{10!}{7! 3!} = \frac{4 \times 3 \times 2 \times 1 \times 10}{3 \times 2}$$

In 2^{10} throws \Rightarrow 120 possibilities

$$\frac{512}{120} = \frac{100}{x}$$

$$\therefore x = 12$$