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PAS

Tut-4

Ans-1 Exact two will be defective

a) → prob. of a defective Pen $= \frac{1}{10} = 0.1$

$P + Q = 1$

$Q = 1 - P$

Non prob. of a Non defective Pen

$\Rightarrow Q = 1 - P$

$Q = 1 - 0.1$

$n = 12$ $\quad Q = 0.9$

$P(x) = {}^{n}C_{x} P^{x} Q^{n-x}$

$= {}^{12}C_{2} (0.1)^{2} (0.9)^{10}$

$= 0.2301$

b) At least 2 defective

$P(x \geq 2) \Rightarrow 1 - [P(x=0) + P(x=1)]$

$1 - \left[{}^{12}C_{0} \left(\frac{1}{10}\right)^{0} \left(\frac{9}{10}\right)^{12} + {}^{12}C_{1} \left(\frac{1}{10}\right)^{1} \left(\frac{9}{10}\right)^{11} \right]$

$1 - \left[\left(\frac{9}{10}\right)^{12} + \frac{12 \times (9)^{11}}{(10)^{12}} \right]$

$= 1 - [0.376 + 0.282]$

$= 1 - 0.658 = 0.342$

c) $P(x=0) = {}^{12}C_0 \left(\frac{1}{10}\right)^0 \left(\frac{9}{10}\right)^{12}$

$= 0.282.$

Ans 2 $n = 7 \quad p = 10\% = \frac{10}{100} = 0.1$

$q = 1 - 0.1 = 0.9$

Probability of out of 7, 5 or more workmen will contact the disease :-

$P(x \geq 5)$

$P(x=5) + P(x=6) + P(x=7)$

${}^7C_5 (0.1)^5 (0.9)^2 + {}^7C_6 (0.1)^6 (0.9)^1 +$

${}^7C_7 (0.1)^7 (0.9)^0$

$\Rightarrow 21 \times 0.00001 \times 0.81 + 7 \times 0.000001 \times 0.9 +$
$1 \times 0.0000001 \times 1$

$\Rightarrow 0.000170 + 0.0000063 + 0.0000001$

$\Rightarrow$ **0.0008** Ans

(3) Probability of men will die in 50-year

$p = 0.01125$

probability of surviving in 50 year

$$q = 1 - p$$
$$= 1 - 0.01125$$
$$= 0.98875$$

$n = 12$

$x = 0 + 1$

Mean either 1 men will die or no Men will die

$$\Rightarrow {}^{12}C_0 (0.01125)^0 (0.988)^{12} + {}^{12}C_1 (0.01125)^1 +$$

$$\Rightarrow (0.9881)^{11}$$

$$\Rightarrow (0.988)^{11} (0.988 + 0.011)$$

$$(0.988)^{11} (0.999)$$

$$\Rightarrow 0.994$$

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No. of defective	No. of Sample	
x	f	$f(x)$
0		0
1	7	6
2	6	38
3	19	105
4	35	120
5	30	115
6	23	42
7	7	7
	1	433
	128	

$$\bar{x} = \frac{\Sigma f(x)}{N} = \frac{433}{128} = 3.3828$$

$$x = np \text{ or } p = x/n \Rightarrow \frac{3.3828}{7} = 0.48$$

$$p \approx 0.5$$

$$q = 1 - 0.5 = 0.5$$

Ans-5 The probability that the dialing Machine Reaches a live person $(p) = 0.15$.

No. of attempts $(n) = 8$

$$P(y) = {}^{8}C_{y} (0.15)^{y} (0.85)^{8-y}$$

$$y = 0, 1, 2 \ldots\ldots 8$$

So, probability of exactly two successfull calls is given by :-

$$P(x=2) = P(2)$$

$$= {}^{8}C_{2} (0.15)^{2} (0.85)^{6}$$

$$= 0.2376.$$

(6) X = no. of ~~household~~ houses sold

$X \sim Po(8)$

$$P(x=3) = \frac{e^{-8} 8^{3}}{3!} = 0.0286$$

$$P(x>5) = 1 - P(x \leq 5)$$

$$= 1 - 0.1912 = 0.8088$$