

Q1.

$$\lambda = 2$$

$$t = 1 \rightarrow 2 \text{ hour}$$

$$dt = 2 \times 2 = 4$$

$$\Rightarrow \frac{dt^n \times e^{-dt}}{n}$$

$$= \frac{(4)^6 \times e^{-4}}{6!} = 0.104$$

Q2

$$p = 0.1$$

$$q = 0.9$$

$$n = 10$$

$$x = 0, 1$$

Sol:

$$B_0(0, 10, 0.1) = \binom{10}{0} (0.1)^0 (0.9)^{10} = 0.3486$$

$$B_1(1, 10, 0.1) = \binom{10}{1} (0.1)^1 (0.9)^9 = 0.3874$$

$$\begin{aligned} B_0 + B_1 &= 0.3486 + 0.3874 \\ &= \underline{\underline{0.7360}} \end{aligned}$$

Q3

$$x = 5$$

$$p = 0.05$$

$$q = 0.95$$

$$\begin{aligned} \text{Geometric} &= (p) (q)^{5-1} \\ &= (0.05) (0.95)^4 \\ &= 0.041 \end{aligned}$$

Q4

$$\begin{aligned} \text{(a)} \quad b(1; 10, 0.25) &= {}^{10}C_1 p^1 q^{10-1} = {}^{10}C_1 (0.25)^1 (0.75)^9 \\ &= 0.1877 \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad b(0; 10, 0.25) &= {}^{10}C_0 p^0 q^{10-0} = {}^{10}C_0 (0.25)^0 (0.75)^{10} \\ &= 0.0563 \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad \text{Geometric} &= (0.25) (0.75)^{11-1} \\ &= 0.0141 \end{aligned}$$

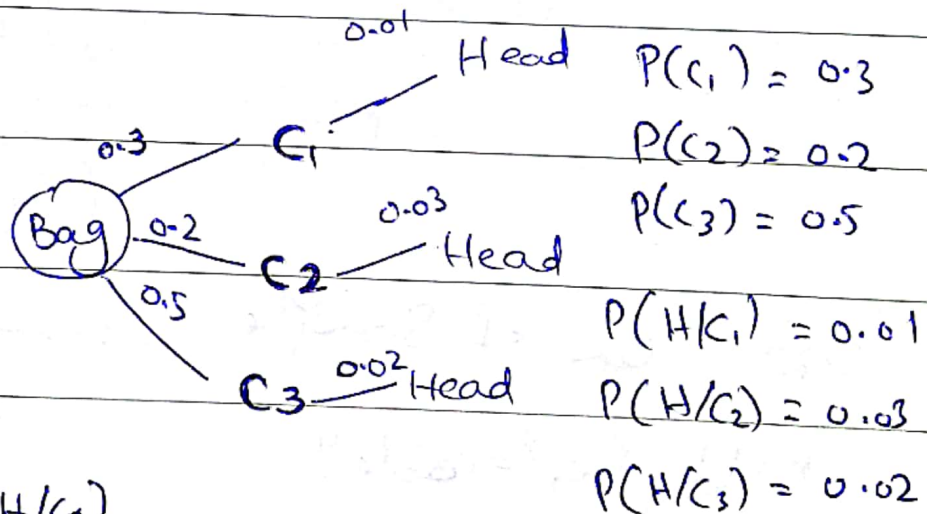
Q5

Multinomial

$$f(x_1, x_2, x_3; p_1, p_2, p_3) = \frac{n!}{x_1! x_2! x_3!} \times p_1^{x_1} \times p_2^{x_2} \times p_3^{x_3}$$

$$= \frac{6!}{2! \times 3! \times 1!} \times (0.222)^2 \times (0.611)^3 \times (0.1657)^1$$

$$= 0.1125$$

Q6

$$P(C_1/H) = \frac{P(C_1) P(H/C_1)}{P(H)}$$

$$\text{Total} \rightarrow P(C_1) P(H/C_1) + P(C_2) P(H/C_2) + P(C_3) P(H/C_3) = 0.158$$

$$P(C_2/H) = \frac{P(C_2) P(H/C_2)}{\text{Total}} = 0.315$$

$$P(C_3/H) = \frac{P(C_3) P(H/C_3)}{\text{Total}} = \boxed{0.52} \text{ Ans.}$$

Q7

Is not included.

Q8

$$P(X=x) = h(x; N, n, k) = \frac{k(x)(n-k)(n-x)}{(N)_n}$$

$$\binom{5}{2} \binom{7}{3}$$

Hyper Geometric

$$(N)_n$$

$$\binom{12}{5}$$

$$= \frac{(10)(35)}{792} = 0.442$$



Q9

$$\binom{5}{3} \binom{4}{0}$$

Hyper Geometric

$$= 0.119$$

$$\binom{9}{3}$$



Q10

$a_1=3, a_2=4, a_3=3, n_1=1, n_2=2, n_3=2$ Multivariate Hypergeometric

$$N=10, n=5$$

$$f(1,2,2;3,4,3,10,5) = \frac{\binom{3}{1} \binom{4}{2} \binom{3}{2}}{\binom{10}{5}} = 0.21428$$

Q11

Binomial Distribution

$$n=10 \quad p=0.9 \quad q=0.1$$

$$\begin{aligned} P(X \geq 9) &= 1 - P(X < 9) = 1 - \sum_{x=0}^{x=8} b(x; 10, 0.9) \\ &= 1 - 0.2639 \\ &= 0.7361 \end{aligned}$$

Q12

Multiplication rule on Conditional

$$P(A) = 0.1 \quad P(A') = 0.9 \quad P(B) = 0.08 \quad P(B') = 0.92 \quad P(C) = 0.12$$

$$(a) \rightarrow (\text{Accepted 1st dep}) \times (\text{Rejected 2nd dep}) \quad P(C') = 0.88$$

$$= (0.9) (0.08) = 0.072$$

$$\begin{aligned} (b) \rightarrow (\text{Accepted 1st}) \times (\text{Accepted 2nd}) \times (\text{Rejected 3rd}) \\ &= (0.9) (0.92) (0.12) \\ &= 0.099 \end{aligned}$$

Q13 Consider the Events

H - husband will vote

W - wife will vote

Then

$$P(H) = 0.21, P(W) = 0.28, P(H \cap W) = 0.15$$

$$a) P(H \cup W) = P(H) + P(W) - P(H \cap W)$$

$$= 0.21 + 0.28 - 0.15$$

$$= 0.34$$

$$b) P(W|H) = \frac{P(H \cap W)}{P(H)} = \frac{0.15}{0.21} = 0.7143$$

$$c) P(H|W') = \frac{P(H \cap W')}{P(W')} = \frac{0.06}{0.72} = 0.0834$$

$$P(W') = 1 - 0.28 = 0.72$$

$$P(H \cap W') = P(H) \cdot P(W') = (0.21)(0.72) = 0.1512$$

Q14

A = LED is defective

B = Device classify LED as defective

$$P(A) = 0.05, P(A') = 0.95$$

$$P(B|A) = 0.78, P(B|A') = 0.06$$

$$P(B) = P(A \cap B) + P(A' \cap B)$$

$$= P(A) P(B|A) + P(A') P(B|A')$$

$$= (0.05)(0.78) + (0.95)(0.06)$$

$$= 0.096$$

Q15

$$P(M_1 \cap M_2 \cap M_3 \cap M_4) = 0.1 \times 0.1 \times 0.1 \times 0.1$$
$$= 0.0001$$

$$P(T \cap H \cap G' \cap I') = P(T) \times P(H) \times P(G') \times P(I')$$

$$= 0.1 \times 0.1 \times 0.9 \times 0.9$$

$$= 0.081$$