B. Tech. (CSBS) Poisson Distribution Tutorial

Q.01 $n=100$, $p = 5\% = 0.05$.

① $P(x>10) = 1 - P(x \leq 10)$

Q.02 Class

Q.03 $n = 4000$, $p = \frac{10}{100000} = 0.0001$

$P(x \geq 3) = 1 - P(x<3)$

Q.04 $p = 0.1\% = \frac{0.1}{100} = 0.001$, $n = 500$, $N = 100$

① $P(0)$ ② $P(x \geq 2) = 1 - P(x<2)$

Q.05 $p = \cancel{0.5}\ (\frac{1}{2})^6 = \frac{1}{64}$, $n = 6400$

$np = 100$. $P(9) = ?$

Q.06 $p = \frac{1}{\cancel{390}\ 520}$ $n = 390$

Q.07 $P(3) = \frac{2}{3} P(4)$.

Q.08 $\lambda = np = 2$

(i) $P(3)$ (ii) $P(x \leq 2)$ (iii) $P(x \geq 1)$

Q.09 $P(2) = g(P(4)) + g \circ P(6)$ ie $m^4 + 3m^2 - 4 = 0$ or $(m^2+4)(m^2-1) = 0 \Rightarrow m = \pm 1$.

Q.10 ~~$P(1) = P(2)$~~ $P(Y=2) = P(Y=3)$

$P(X=1) = P(X=2)$

$\frac{e^{-m_1} \cdot m_1}{1} = \frac{e^{-m_1} \cdot m_1^2}{2!}$ | $\frac{e^{-m_2} \cdot m_2^2}{2!} = \frac{e^{-m_2} \cdot m_2^3}{3!}$

$\Rightarrow m_1(2-m_1)=0$ $\qquad m_2^2(3-m_2)=0$

$\Rightarrow m_1=2$ $\qquad m_2=3$

$\Rightarrow \text{Var}(X)=2$ $\qquad \text{Var}(Y)=3$

$$\text{Var}(2X-3Y) = 4V(X)+9V(Y)$$
$$= 4(2)+9(3)$$
$$= 35 \text{ Ans}$$

Q.11 Mean $=2$, Var $=3$ Not possible as in Poisson dist Mean $=$ Var $=\lambda$

Q.12 $P(1)=2P(2)$, $m=1$

Q.13 $\lambda=4$ (i) $P(x\leq 2)$ (ii) $P(3)$

Q.14 $m=\lambda=4$ $\qquad \sigma=2$

$$P(m-2\sigma<X<m+2\sigma)$$
$$P(4-4<X<4+4) = P(0<x<8)$$
$$= P(1)+P(2)+---+P(7)$$

Q.15 $\text{Var}=\lambda=2$.

Find $P(1)$, $P(2)$, $P(3)$ & $P(4)$

Q.16 $\lambda=3$ (i) $P(2)$ (ii) $P(x>4)$

Q.17 $\lambda=m_1$, $\lambda_2=m_2$, $\lambda=m_1+m_2$

$$P(X+Y) = \frac{e^{-(m_1+m_2)}\cdot(m_1+m_2)^k}{k!}$$

$m_1 = 2$, $m_2 = 3$

~~m for $3X - 2Y$ is $m = 3m_1 - 2m_2 = 3(2) - 2(3) = 0$~~

$\text{Var } X = 2$ $\quad$ $\text{Var } Y = 3$

$$\text{Var}(3X - 2Y) = 9V(X) + 4\text{Var}(Y)$$
$$= 9(2) + 4(3)$$
$$= 30 \text{ Ans}$$

Q.19 $Z = X_1 + X_2 + X_3$, $m = m_1 + m_2 + m_3 = 1 + 2 + 3 = 6$

$$P(Z > 3) = 1 - P(0) - P(1) - P(2)$$
$$= 1 - e^{-6} - 6e^{-6} - \frac{6^2 e^{-6}}{2!}$$
$$= 0.938 \text{ Ans}$$

Q.20 $p = 0.01$ $\quad$ $n = 10$

$$P(x > 1) = 1 - P(0) - P(1)$$

Q.21 $n = 200$, $\quad p = 2\% = 0.02$

$$P(x \leq 4) = P(0) + P(1) + P(2) + P(3) + P(4)$$

Q22 $p = \frac{1}{500}$, $n = 10$ $\quad N = 10000$

$P(0)$ $\quad P(1)$ $\quad P(2)$

Q23 $\lambda = 3$, $P(0)$, $P(x > 3)$

Q24 $p = 0.05$, $n = 20$. , $N = 1000$

$P(x \leq 2)$ $\quad P(2)$ $\quad P(x \leq 2)$

Q25 $n = 100$, $\quad p = 5\%$, $\quad N = 1000$

$P(x \leq 4)$

Q26 $\lambda = 2.5$, $P(0)$, $P(1)$ $P(2)$ $P(3)$ $P(x \leq 4)$ $P(x > 6)$
$P(x \leq 5)$ $\quad P(x \geq 20)$

$p = \frac{1}{1000}$, $n = 10000$

$P(6)$ or $P(7)$ or $P(8) = P(6) + P(7) + P(8)$

Q28 Mean $= \lambda = \frac{\Sigma fx}{\Sigma f}$

Q29 $\lambda =$ Mean $= \frac{\Sigma fx}{\Sigma f}$

Q30 $n = 300$, $p = 0.02$

$P(2) + P(3)$.

Q31 $p = 0.001$ $n = 2000$.

$P(x > 2)$

Q32 $\lambda = 3$, $P(5)$.