

Problem-1

$$p = 0.3$$

$$x = \{1, 2, 3, 4, 5, 6\}$$

$$n = 6$$

$$r = 2$$

$${}^6C_2 = \frac{6!}{2!(6-2)!}$$

$$= \frac{6!}{2! \times 4!}$$

$$= \frac{6 \times 5 \times 4!}{2! \times 4!}$$

$$= \frac{30}{2}$$

$$P(x) = {}^n C_x \cdot p^x \cdot (1-p)^{n-x}$$

$$P(2) = {}^6 C_2 \cdot (0.3)^2 \cdot (0.7)^{6-2}$$

$$= 15 \times (0.09) \cdot (0.7)^4$$

$$P(2) = 15 \times (0.09) \cdot (0.7)^4$$

$$= 0.32415$$

$$\mu = np$$

$$= 6 \times (0.32)$$

$$= 1.92$$

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

$$= \sqrt{1.92(0.7)}$$

$$= \sqrt{1.344}$$

$$= 1.159$$

~~$\frac{12-1}{2} = \frac{11}{2} = 5.5$~~

~~$\frac{6-1}{2} = \frac{5}{2} = 2.5$~~

$$\begin{aligned}
 2) \quad & n = 8 \\
 & r = 5 \\
 & p = (0.75)
 \end{aligned}$$

$$\begin{aligned}
 P(n) \quad {}^8C_5 &= \frac{8!}{5! \times (8-5)!} \\
 &= \frac{\cancel{8} \times \cancel{7} \times \cancel{6} \times \cancel{5}!}{5! \times \cancel{(3 \times 2 \times 1)}} \\
 &= 56
 \end{aligned}$$

$$\begin{aligned}
 &\Rightarrow 56 \times (0.75)^5 (0.25)^3 \\
 &= 0.207
 \end{aligned}$$

$$\begin{aligned}
 B: \quad & n = 12 \\
 & r = 5 \\
 & p = 0.45
 \end{aligned}$$

$$\begin{aligned}
 {}^{12}C_5 &= \frac{12!}{5! (12-5)!} \\
 &= \frac{12!}{5! (7!)}
 \end{aligned}$$

$$\begin{aligned}
 &= \frac{12 \times 11 \times 10 \times 9 \times 8 \times \cancel{7!}}{5! \times \cancel{7!}} \\
 &= \frac{12 \times 11 \times 10 \times 9 \times 8}{5 \times 4 \times 3 \times 2 \times 1} \\
 &= 12 \times 11 \times 6 \\
 &= 792
 \end{aligned}$$

$$\begin{aligned}
 &\Rightarrow 792 \times (0.45)^5 (0.55)^7 \\
 &\Rightarrow 0.222
 \end{aligned}$$

$$= \frac{8!}{4! \times (8-4)!}$$

$$= \frac{8!}{4! \times 4!}$$

$$= \frac{8 \times 7 \times 6 \times 5 \times 4!}{4! \times 4 \times 3 \times 2 \times 1}$$

$$= 2 \times 7 \times 5$$

$$= 70$$

$$= 70 \times (0.75)^4 (0.25)^4$$

$$= 0.086$$

while

$$= \frac{8!}{6! (2!)}$$

$$= \frac{8 \times 7 \times 6!}{6! \times 2!}$$

$$= \frac{8 \times 7}{2}$$

$$= 24$$

$$= 24 \times (0.75)^6 (0.25)^2$$

$$= 0.266$$

$$= {}^{12}C_4 \Rightarrow \frac{12!}{4! (12-4)!}$$

$$= \frac{12 \times 11 \times 10 \times 9 \times 8!}{4! \times 8!}$$

$$= \frac{12 \times 11 \times 10 \times 9}{4 \times 3 \times 2 \times 1}$$

$$= 11 \times 5 \times 9$$

$$= 55 \times 9$$

$$= 495$$

$$P(x=4) \Rightarrow 495 \times (0.45)^4 (0.55)^8$$

$$\Rightarrow 0.169$$

$$P(x=6) \Rightarrow {}^{12}C_6 \Rightarrow \frac{12!}{6! (6!)}$$

$$\Rightarrow \frac{12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6!}{6! \times 6!}$$

$$\Rightarrow \frac{12 \times 11 \times 10 \times 9 \times 8 \times 7}{6 \times 5 \times 4 \times 3 \times 2 \times 1}$$

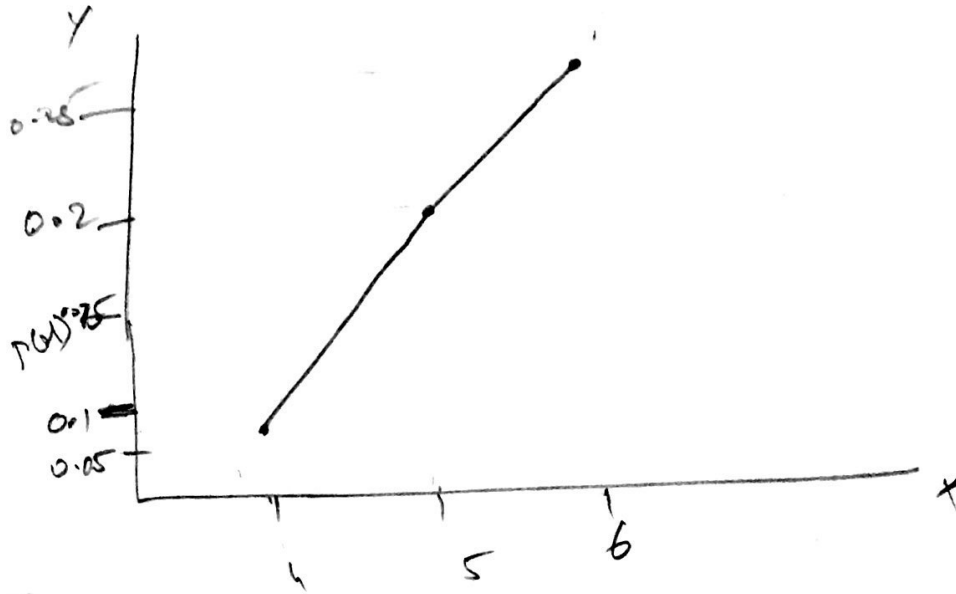
$$\Rightarrow 11 \times 3 \times 4 \times 7$$

$$\Rightarrow 33 \times 4 \times 7$$

$$\Rightarrow 924 \times (0.45)^6 (0.55)^6$$

$$\Rightarrow 0.212$$

S



B



Poisson distribution

$$\mu = \frac{72}{60} = 1.2 \quad \mu = 1.2 \times 4 = 4.8$$

$$P(5) = \frac{e^{-4.8} (4.8)^5}{5!}$$

$$= \frac{(2.7) (4.8)^5}{5!}$$

$$= 0.18$$

$$P(0) + P(1) + P(2) + P(3) =$$

$$\Rightarrow \frac{(2.7) (4.8)^0}{0!} + \frac{(2.7) (4.8)^1}{1!} + \frac{(2.7) (4.8)^2}{2!} + \frac{(2.7) (4.8)^3}{3!}$$

$$\Rightarrow 0.3$$

$$P(4) + P(5) \Rightarrow \frac{(2.7) (4.8)^4}{4!} + \frac{(2.7) (4.8)^5}{5!}$$

$$\Rightarrow 0.368$$

4)

→ 77/minute → words. (n)

→ 0.1/minute → error (x)

$$= \frac{0.1 \times 455}{77}$$

$$\mu = \frac{0.1}{77} \times 455$$

$$= 0.59$$

$$P(x=2) = \frac{(2.7)^2 \times 0.59}{2!}$$

$$= 0.096$$

$$\mu = \frac{0.1}{77} \times 1000$$

$$= 1.29$$

$$P(x=2) = \frac{(2.7)^2 \times 1.29}{2!}$$

$$= 0.23$$

$$\mu = \frac{0.1}{77} \times 255$$

$$= 0.33$$

$$P(x=2) = \frac{(2.7)^2 \times 0.33}{2!}$$

$$= 0.039$$

