problem-1

$P = 0.3$

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

$n = 6$

$r = 2$

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

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

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

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

$$P(x) = 15 \times P^x (1-P)^{n-x}$$

$$P(x=2) = 15 \times (0.3)^2 (0.7)^{6-2}$$

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

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

$$= 0.32415$$

$$\mu = np$$

$$= 6 \times (0.32)$$

$$= 1.92$$

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

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

$$= \sqrt{1.34}$$

$$= 1.159$$

2)

G ⇒ $n = 8$

$r = 5$

$P = (0.75)$

$P(x) \quad {}^{8}C_5 = \frac{8!}{5! \times (8-5!)}$

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

$= 56$

$\Rightarrow 56 \times (0.75)^5 (0.25)^3$

$= 0.207$

B: $n = 12$

$r = 5$

$P = 0.45$

${}^{12}C_5 = \frac{12!}{5!(12-5!)}$

$= \frac{12!}{5!(7!)}$

$= \frac{12 \times 11 \times 10 \times 9 \times 8 \times 7!}{5! 7!}$

$= \frac{12 \times 11 \times 6 \times 9 \times 4}{8 \times 4 \times 3 \times 2 \times 1}$

$= 12 \times 11 \times 6$

$= 792$

$\Rightarrow 792 \times (0.45)^5 (0.55)^7$

$\Rightarrow 0.222$

of 6 questions

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

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

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

$= 2 \times 7 \times 5$

$= 70$

$P(x=4) = 70 \times (0.75)^{4} (0.25)^{4}$

$= 0.086$

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

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

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

$= 11 \times 5 \times 9$

$= 55 \times 9$

$= 495$

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

$\Rightarrow 0.169$

Part c

$P(x=6) = {}^{8}C_{6} \Rightarrow \frac{8!}{6!(2!)}$

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

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

$= 24$

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

$= 0.266$

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

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

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

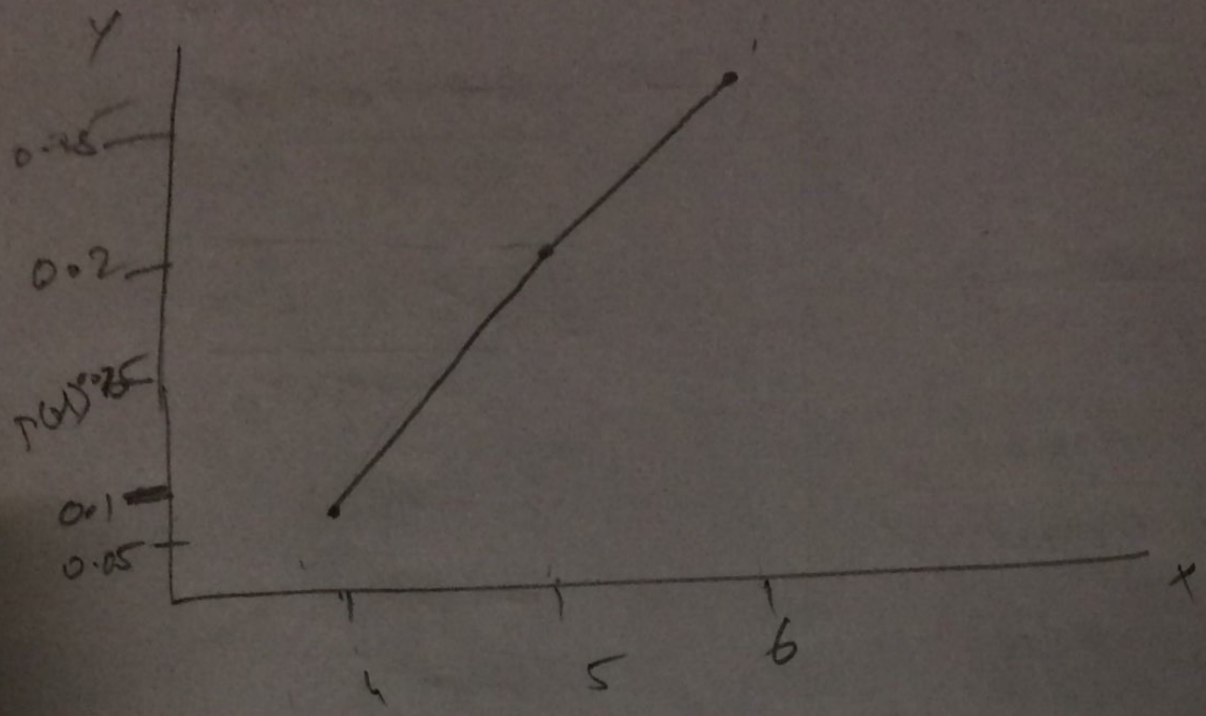
$\Rightarrow 11 \times 3 \times 4 \times 7$

$\Rightarrow 33 \times 4 \times 7$

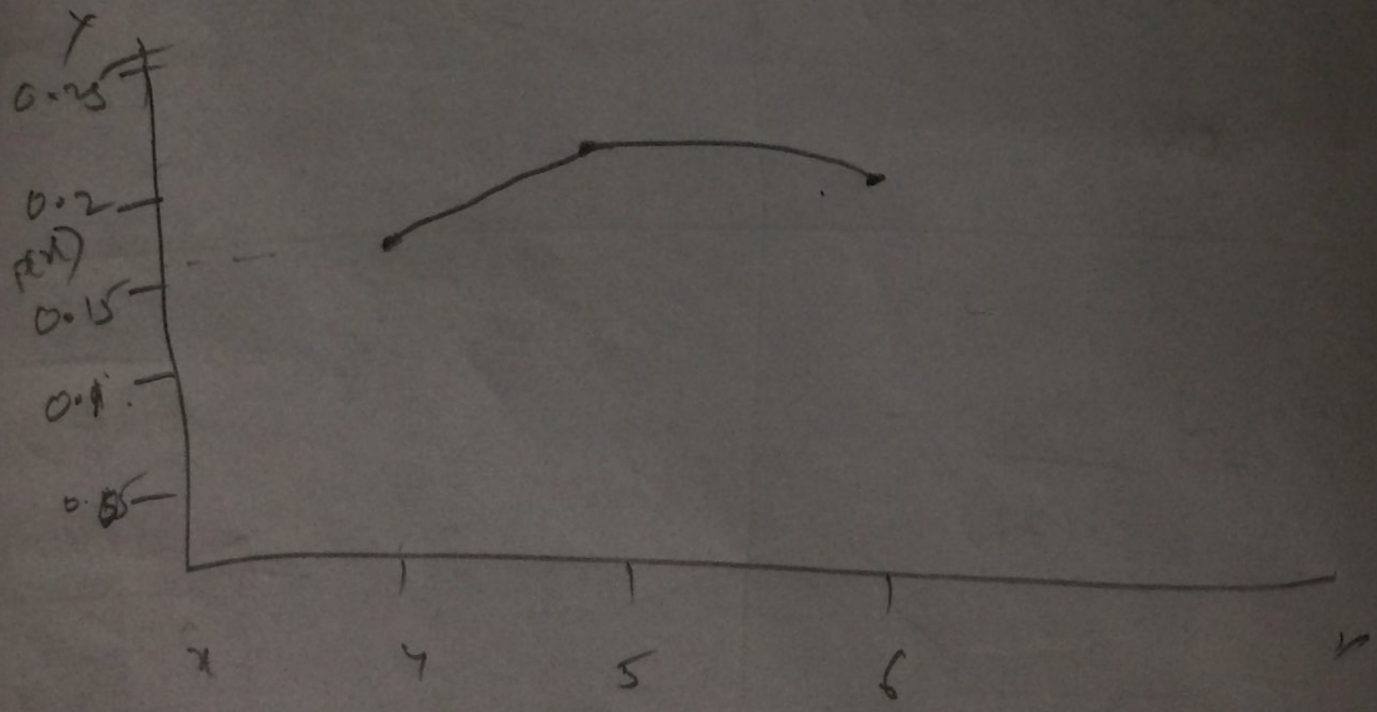
$\Rightarrow 924 \times (0.45)^{6} (0.55$

$\Rightarrow 0.212$

5



B



poisson distribution

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

$$P(5) = \frac{e^{-72}(4.8)^5}{5!}$$

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

$$= 0.18$$

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

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

$$\Rightarrow 0.3$$

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

$$\Rightarrow 0.368$$

4)

→ 77/minute → words. (n)

→ 0.1/minute → error (x)

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

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

$= 0.59$

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

$= 0.096$

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

$= 1.29$

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

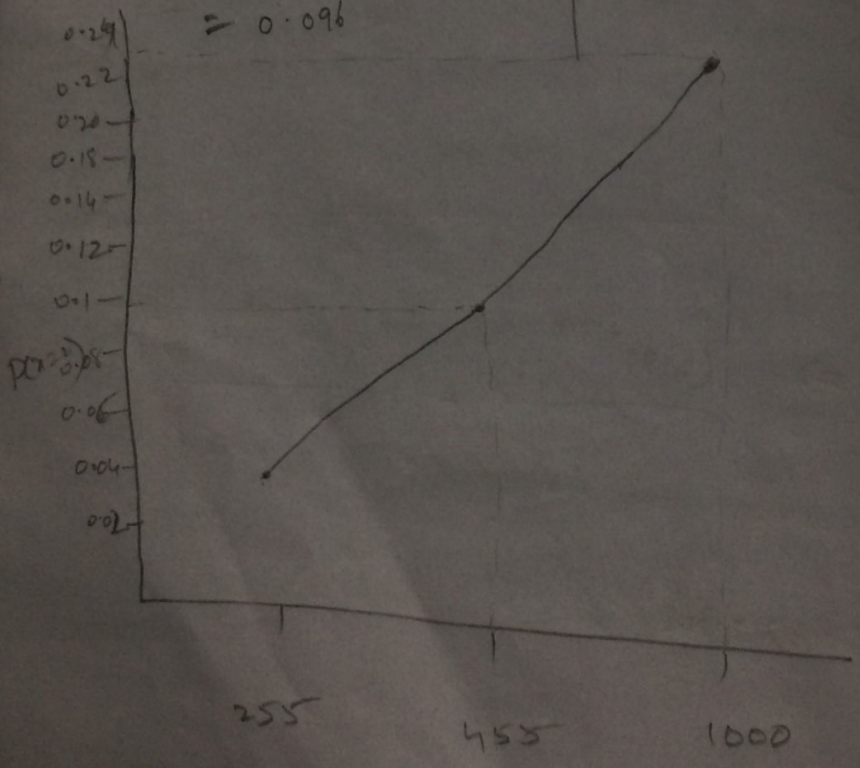
$= 0.23$

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

$= 0.33$

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

$= 0.039$



AB-14

1) $f(x) = 20\, e^{-20(x-12.5)}$

Limit : 12.5 to 12.6

$$\Rightarrow \int_{12.5}^{12.6} 20\, e^{-20(x-12.5)}\, dx$$

$$\Rightarrow 20\left[\frac{1}{-20} e^{-20(x-12.5)}\right]$$

$$\Rightarrow -\left[e^{-20(x-12.5)}\right]_{12.5}^{12.6}$$

$\frac{12.6-12.5}{0.1}$

$$\Rightarrow -\left[e^{-20(12.6-12.5)} - e^{-20(12.5-12.5)}\right]$$

$$\Rightarrow -\left[e^{-20(0.1)} - e^{-20(0)}\right]$$

$$\Rightarrow -\left[e^{-2} - e^{0}\right]$$

$$= -[-1 + e^{-2}]$$

$$= 1 - e^{-2}$$

$$= 0.863$$

Area $= 1 - 0.863$

Area $= 0.137$

CDF at 11 is zero due it will not give