(A)

Q1. (a) Given.

$a_x = 30m$

$\sigma_x = 5m$

$f_x = 26m$

Req:-

(i) What is the Probability of being disqualified in the qualifying round

(ii) In the main event what is the Probility the record will be broken.

Sol:-

As we know that

(i) $P\{x \le 26m\} = F_x(26)$

$= F\left(\frac{26-30}{5}\right)$

$= F = (-0.8)$

$= 1 - F(0.8)$

$= 1 - 0.7881$

$= 0.2113$

(ii)

$$P\{x > 42\} = 1 - F_x(42)$$

$$= 1 - F\left(\frac{42-30}{5}\right)$$

$$= 1 - F\left(\frac{42-30}{5}\right)$$

$$= 1 - F(2.4)$$

$$= 1 - 0.9918$$

$$= 0.0082.$$

(B)
Q7

Solution (a)

$P\{1980 - 68 < x \le 1980 + 68\}$

$F_x(2048) - F_x(1912)$

$F\left(\frac{2048 - 1800}{80}\right) - F\left(\frac{1912 - 1800}{80}\right)$

$F(3.1) - F(1.4)$

$F(0.9990) - (1 - 0.9192)$

$= 0.0807192.$

(b)

Solution: (b)

$P\{x > 2050\} = 1 - P\{x < 2050\}$

$1 - F_x(2050) = 1 - F\left(\frac{2050 - 1800}{80}\right)$

$= F(3.125)$

$= 1 - 0.9992 = 0.0008.$

Q7(c) Solution:-

As we know that

$$fx(x) = \int_0^b \frac{e^{5x}}{8} \, dx = 1$$

$$= 1/8 \left[\int_0^b e^{5x} \, dx \right] = 1$$

$$= 1/8 \left[\frac{e^{5x}}{5} \Big|_0^b \right] = 1$$

$$= 1/8 \left[\frac{e^{5b}}{5} - \frac{e^{5(0)}}{5} \right] = 1$$

$$= 1/8 \left[\frac{e^{5b}}{5} - \frac{1}{5} \right] = 1$$

$$= \frac{e^{5b} - 1}{5} = 4$$

$$= e^{5b} - 1 = 20$$

$$= e^{5b} = 20 + 1 = e^{5b} = 21$$

$$\left\{ b = \frac{1}{5} \ln(21) \right\}_{\text{Ans}}$$

Q 2(A)

Solution:-

(a)

$P(5 \text{ or more}) = 1 - P(0) - P(1) - P(2) - P(3) - P(4)$

$= 1 - e^{-3}\left(1 + 3 + \frac{(3)^2}{2!} + \frac{(3)^3}{3!} + \frac{(3)^4}{4!}\right]$

$= 1 - \frac{131}{8} e^{-3} = 0.1847$

(b) $P(0) = e^{-3} = 0.0498$

average no. of week per year with no murders $= 52(e)^{-3}$ ~~= 2.5889 w~~

$= 2.5889$ weeks

(C) $P(3 \text{ or more}) = 1 - P(0) - P(1) - P(2)$

$= 1 - e^{-3}\left[1 + 3 + \frac{3^2}{2}\right]$

$= 1 - \frac{17}{2} e^{-3} = 0.5768$ average numbers of weeks per year that no. of murders exceeds the average $= 52\left[1 - \frac{17}{2} e^{-3}\right]$

$= 29.9941$ weeks.

Q2(b):-

solution

(a) $F_x(6.5) = \sum_{n=1}^{6} \frac{n^3}{650} u(x-n)$

$= \frac{1}{650} + \frac{(2)^3}{650} + \frac{(3)^3}{650} + \frac{(4)^3}{650} + \frac{(5)^3}{650} + \frac{(6)^3}{650}$

$= \frac{1}{650} + \frac{8}{650} + \frac{27}{650} + \frac{64}{650} + \frac{125}{650} + \frac{216}{650}$

$= \frac{441}{650} = 0.6784$

(b) $= 1 - F_x(4)$

$= 1 - \sum_{n=1}^{4} \frac{n^3}{650}$

$= 1 - \left(\frac{(1)^3}{650} + \frac{(2)^3}{650} + \frac{(3)^3}{650} + \frac{4^3}{650}\right)$

$= 1 - \left(\frac{1+8+27+64}{650}\right)$

$= 1 - \left(\frac{100}{650}\right)$

$$= \frac{650-100}{650}$$

$$= \frac{550}{650}$$

$$= 0.8461$$

(c) $P(6 < x \leq 9) = F_x(9) - F_x(6)$

$$= \sum_{n=1}^{9} \frac{n^3}{650} - \sum_{n=1}^{6} \frac{n^3}{650}$$

$$= \frac{7^3}{650} + \frac{8^3}{650} + \frac{9^3}{650}$$

$$= \frac{343+512+729}{650}$$

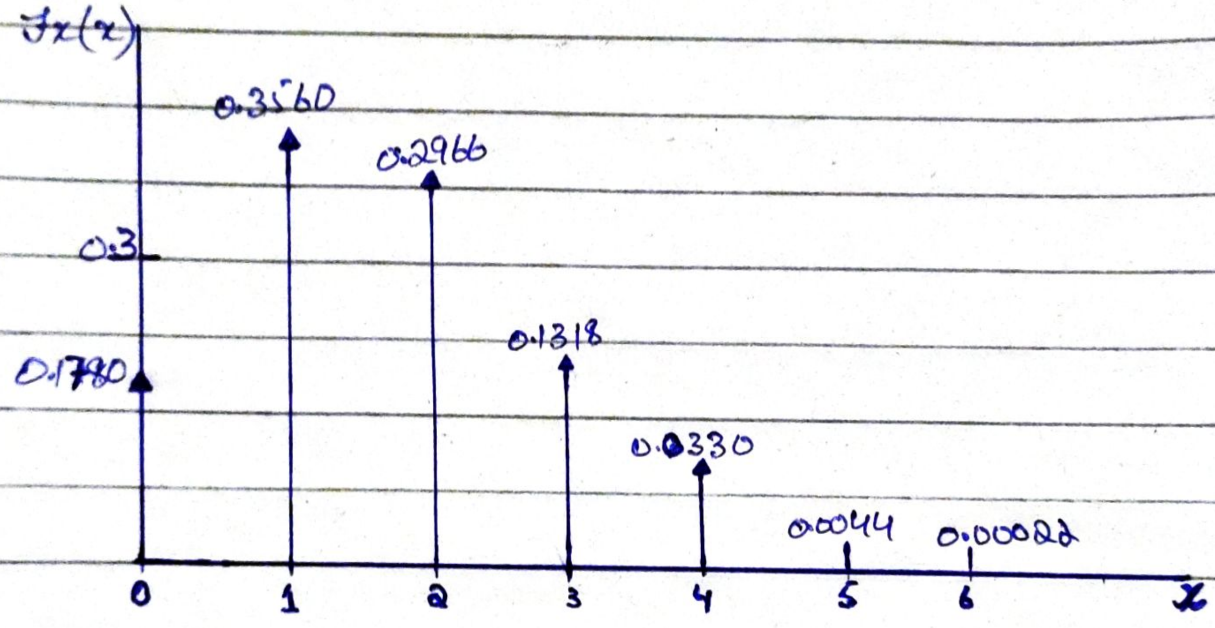
$$= \frac{1584}{650}$$

$$= 2.4369 \text{ Ans}$$

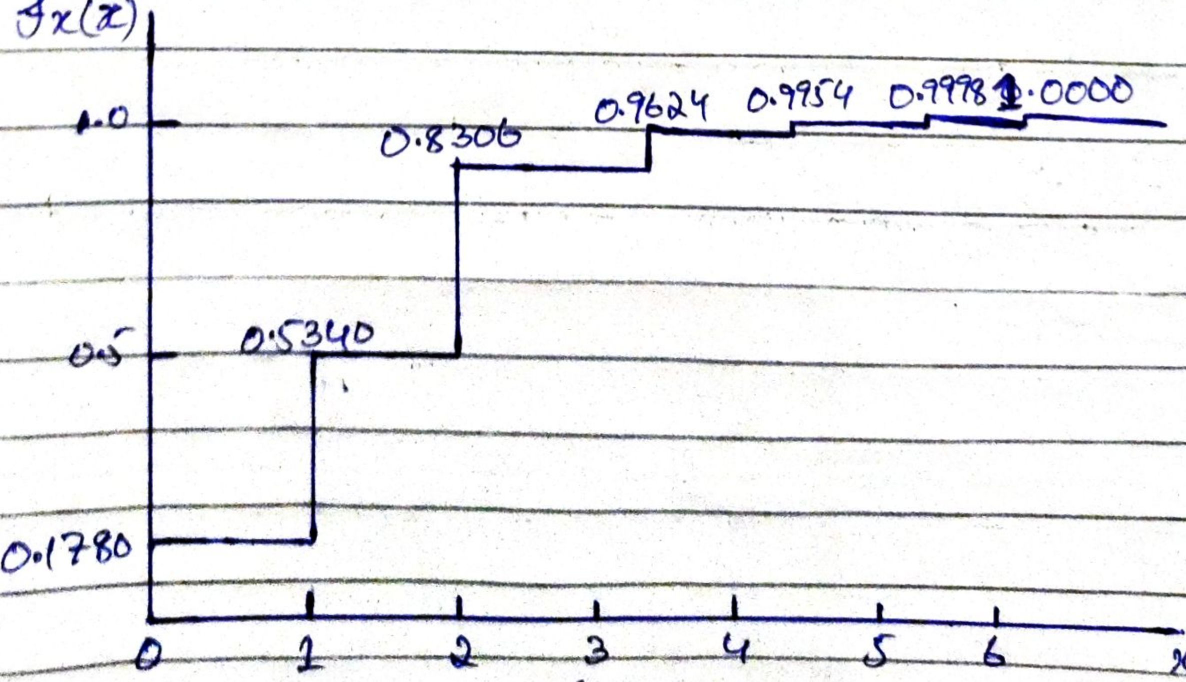
Q2(C)

Solution

The binomial density & distribution Function for N=6 and P=0.25



(a)



(b)

Q3A8-

Solution

$E[g(x)] = E[x^3]$

$= \int_0^\infty \frac{1}{2} x^3 e^{-x/2} dx$

use C-48

$= \frac{1}{2}\left(\frac{6}{(1/2)^4}\right)$

$= 0.5\left(\frac{6}{0.0625}\right)$

$= 48 \rightarrow$ Ans

Q3 b8-

Solotion

$P(A \text{ wins}) = P(H,H,T) + P(H,T,H) + P(T,T,H) + P(T,H,T)$

$= \frac{4}{8} = \frac{1}{2}$

$P(B \text{ out after first toss}) = P(H,T,T) + P(T,H,H)$

$= \frac{2}{8} = \boxed{\frac{1}{4}}$

Ans