HOMEWORK - 4 9100p - 17 Ankita Ajit Doddihal Dhwani Kirankumar Trivedi Miraj Bhimani

Problem - 1 Using multinomial distribution f (x,122;..., xxjp1, p2 - pkon) $= \left(\begin{array}{c|c} n & \chi_1 & \chi_2 & \chi_k \\ \chi_1 & \chi_2 & \chi_k \end{array}\right) p_1 \chi_1 p_2 \chi_2 \dots p_k \chi_k.$ with K $\leq \chi_i = n \quad \ell \quad \leq P_i = 1$ i=1f(3,3,1,2;0.4,0.2,0.3,0.1,9) $= \begin{pmatrix} 9 & (6.4)^3 & (0.2)^3 & (0.3)^1 & (0.2)^2 \\ 3, 3, 1, 2 & \end{pmatrix}$ $(0.4)^3(0.2)^3(0.2)^2$ = 0.0077

$$D = 20$$
 $p = 0.3$ $q = 0.7$

(a)
$$P(X \ge 28) = 1 - P(X \angle 8)$$

$$= 1 - \left[\left(\frac{20}{2} \right) \left(0.3 \right)^{2} \left(0.7 \right) \right]$$

(b)
$$P(X \le 3) = \le b(x; 20, 0.3)$$

$$P(X \le 3) = 0.00079 + 0.0068 + 0.027$$

+ 0.0716

(c) P(x=5) = b(5; 20, 0.3)

P(X=5) = 6.1789

Prob of five failing is 17.89%.

: 30% applies to this plant.

$$N=10$$
 $n=4$

$$K = (10-2) = 8$$

$$= \frac{2}{5} h(x, 10, 4, 2)$$

$$2(=1)$$
= $(2(1))(8(3)) = 8$

$$10(4)$$

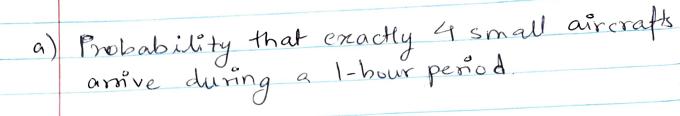
$$x = 2$$

$$= (2(1) (8(2)) = 2$$

$$= 15$$

$$P(\text{at most 2 will not fire}) = \frac{1}{3} + \frac{8}{15} + \frac{2}{15}$$

$$= \frac{1}{15}$$



$$P(X \ge 4) = 1 - P(X \le 3)$$

$$P(x \ge 4) = 1 - [P(0) + P(1) + P(2) + P(3)]$$

$$= 1 - \left[e^{-6}(6)^{\circ} + e^{-6}(6)^{\dagger} + e^{-6}(6)^{2} + e^{-6}(6)^{3} \right]$$

$$= 1 - [0.00247 + 0.0148 + 0.0446 + 0.0892]$$

$$= 1 - [0.15307)$$

c)
$$P(x \ge 75) = 1 - P(x \le 74)$$

$$M = 6t = 6(12) = 72$$

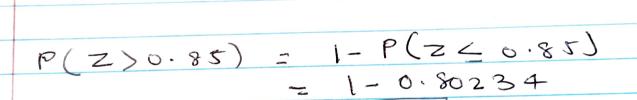
$$P(X \ge 75) = 1 - \frac{74}{6} e^{-6} (72)^{2}$$

$$P(X \ge 75) = 6.3773$$

(a)

P(x>31.7)=P(31.7-30)=0.85

$$P(Z)0.85) = 1-P(Z \leq 0.85)$$



= 1-0.80234

P(Z)0-85) - 0.1977

 $P(29.3 < \times < 33.5) = P(-0.36 < 2 < 1.75)$ = P(Z < 1.75) - P(Z < -0.35) = 0.95994 0.36317

= 0.95994 - 0.36317 = 0.59677

= 59.677%

Problem 5

c) Shorter than 25-5cm

$$P(X \le 25.5) = P(2 \le 25.5 - 30)$$

$$= P\left(2 < -4.5\right)$$
$$= P\left(2 < -2.25\right)$$

Using std normal table.

P(Z(-2.25) = 0.0122

= 1.22% leaves are shorter than 25.5cm.

$$(a) \Rightarrow P(X \leq I)$$

$$X = 2$$
 $3 = 1/2$

$$G(x) = B^{-\alpha} e^{-x/B} x^{\alpha-1} = 4xe^{-2x}$$

$$P(X \leq I) = \int b_1(x) dx = \int 4\pi e^{-2\pi} dx$$

$$= 4 \left[\frac{\chi e^{-2\chi} - e^{-2\chi}}{4} \right]$$

$$P(x \le 1) = 1 - 3 = 0.594$$

(b)
$$P(x \ge 2) = \int G(x) dx$$
.

$$= 4 \left[\frac{\chi e^{-2\chi}}{-2} - e^{-2\chi} \right]$$

$$= 4 \left[0 - \left(-e^{-4} - \frac{4}{e^{4}} \right) \right]$$

$$= 4 \times 5 e^{-4}$$

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$$= 9 \times 5 e^{-4}$$

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$$f(x; \beta) = \begin{cases} 1 e^{-x/\beta}, & x > 0 \\ 6 & \text{elsewhere} \end{cases}$$

$$P(\chi) = \int \frac{1}{3} e^{-\chi/3} d\chi$$

$$= \frac{1}{3} \left[-3e^{-x/3} \right]_{5}^{\infty}$$

$$= e^{-5/3}$$

(b)
$$P(x)10) = \int \frac{1}{3} e^{-x/3} dx$$

$$= \frac{1}{3} \left[-3e^{-\frac{\chi}{3}} \right]_{10}$$

$$P(x \ge 50,000) = 1 - \phi \left(\frac{\ln 50,000 - 5}{2} \right)$$

$$= 1 - \phi(2.9099)$$

Using normal std table

$$P(X \ge 50,000) = 1 - 0.9982$$

 $P(X \ge 50,000) = 0.0018$