

Q17 i) 4, 7, 9, 9, 11, 15, 18, 18, 18, 25

Total no. = 134

No. of observations = 10

Mean = 13.4

Median = $\frac{11+15}{2} = 13$

Mode = 18

ii)	x_i	f_i	$f_i x_i$	
	0	5	0	
	1	11	11	
	2	26	52	Mean = $\frac{\sum f_i x_i}{\sum f_i}$
	3	15	45	= 2
	<u>4</u>	<u>3</u>	<u>12</u>	Median = 2
		60	120	

(f_i max at 2) Mode = 2

Q2) i) $e^{-\frac{\delta}{x!}}$

$$P(0) = e^{-0.5} \frac{0.5^0}{0!} = e^{-0.5} = 0.606 \text{ Ans.}$$

ii)

Q3) i) $\alpha = 2$ $\lambda = 1/2$

$$\text{Mean} = \frac{\alpha}{\lambda} = \frac{2}{1/2} = 4$$

$$\text{Var}(x) = \frac{\alpha}{\lambda^2} = \frac{2}{1/4} = 8$$

$$\text{S.D} = \sqrt{8} = 2\sqrt{2}$$

ii) CDF = $\int_0^{\infty} \text{PDF } dx$

$$f(x) = \frac{\lambda^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\lambda x}$$

$$= \frac{1}{4} x e^{-x/2}$$

$$= \frac{1}{4} \int_0^{\infty} x e^{-x/2} dx$$

$$= \frac{1}{4} \left(x(e^{-x/2}) \cdot (-2) - \int e^{-x/2} (-2) dx \right)$$

$$= \frac{1}{4} \left(-2x e^{-x/2} - 4 e^{-x/2} \right) \Big|_0^{\infty}$$

$$= \frac{1}{4} \times 4 = 1$$

Q4) Total members = 18
male = 10 female = 8

Q5) Probability that package was sent by Level 2 service = $\frac{1}{2}$

Q6) $X \sim U(1, 2)$ $Y = \frac{3}{6-X}$ $Y \sim U(\frac{3}{6-1}, \frac{3}{6-2})$
($X \sim U(\alpha, \beta)$)
 $\alpha = 1$ $\beta = 2$ $= Y \sim U(3/5, 3/4)$

$$f_X(x) = \frac{1}{2-1} = 1$$

$$f_X(Y) = \frac{1}{3/4 - 3/5} = 6.667$$

Q7)	X	P(X=x)
	1	0.05
	2	0.15
	3	0.35
	4	0.4
	5	0.05

i) $F(X) = \sum_{y \leq x} P(X=y)$

$$= 0.35 + 0.15 + 0.05 = .55$$

ii) $E(X) = 0.05 \times 1 + 0.15 \times 2 + 0.35 \times 3 + 0.4 \times 4 + 0.05 \times 5$
 $= 3.25$

iii) $Var(X) = E(X^2) - (E(X))^2$

$$E(X^2) = 0.05 \times 1^2 + 0.15 \times 2^2 + 0.35 \times 3^2 + 0.4 \times 4^2 + 0.05 \times 5^2$$

 $= 11.45$

$$Var(X) = 11.45 - 3.25 = 8.20$$

$$8) P(\text{exceeding } 1000) = 0.2$$

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

$$= \frac{15!}{0!(15-0)!} (0.2)^0 (1-0.2)^{15} +$$

$$\cdot \frac{15!}{1!(14!)} (0.2)^1 (1-0.2)^{14} + \frac{15!}{2!(13!)} (0.2)^2 (1-0.2)^{13}$$

$$= 0.398 \approx 0.4$$

9) Probability of winning a prize is 0.01

$$118) P(\text{of boy}) = \frac{1}{2}$$

$$P(\text{of girl}) = \frac{1}{2}$$

$$P(3 \text{ boys}) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$$

$$13) a=75 \quad b=120$$

$$f_x(x) = \frac{1}{b-a} = \frac{1}{120-75} = \frac{1}{45}$$

$$P(80 < X < 100) = \int_{80}^{100} \frac{1}{45} dx = \frac{1}{45} \cdot 20 = \frac{4}{9} \text{ Ans.}$$

Q14)

$$X \sim \text{Gamma}(5, 0.4)$$

$$\text{Gamma}(\alpha, \lambda)$$

$$\alpha = 5 \quad \lambda = 0.4$$

$$2\lambda \sim \chi^2$$

$$P(X < 22.89)$$

$$= P(2\lambda X < 2\lambda(22.89))$$

~~22.89 is the value of X~~

$$= P(\chi^2 < 18.132)$$

$$P(X < 18) = 0.9450$$

$$P(X < 18) = 0.9929$$

$$= 0.9470856 \text{ approx}$$