

Q1) i) 4, 7, 9, 9, 11, 15, 18, 18, ~~25, 18~~ 18, 25

$$\text{mean} = \frac{\text{Sum of observation}}{\text{total no. of obs}} = \frac{134}{10} = 13.4$$

$$\text{Mode} = 18$$

$$\text{Median} = \frac{11+15}{2} = \frac{26}{2} = 13$$

$$q_1 = \frac{n+1}{4} = \frac{10+1}{4} = 2.75$$

$$q_3 = 3 \left(\frac{n+1}{4} \right) = 11$$

$$\text{IQR} = q_3 - q_1 = 11 - 2.75 = 8.25$$

ii)

X	f	xf	cf
0	5	0	5
1	11	11	16
2	26	52	42
3	15	45	57
4	3	12	60
	<u>60</u>	<u>120</u>	

$$\text{Mean} = \frac{\sum xf}{\sum f} = \frac{120}{60} = 2$$

$$\text{Median} = 2$$

$$\frac{n+1}{2} = \frac{61}{2} = 30.5$$

$$\text{mode} = 2$$

$$q_1 = 1$$

$$q_2 = 2$$

$$q_3 = 3$$

$$\frac{n+1}{4} = \frac{61}{4} = 15.25$$

$$\frac{3(n+1)}{4} = 45.75$$

$$IQR = q_3 - q_1 = 3 - 1 = \underline{\underline{2}}$$

$$Q3) \quad \alpha = 2 \quad \lambda = 1/2 \quad 0 < x < \infty$$

$$i) \quad E(x) = \frac{\alpha}{\lambda} = \frac{2}{1/2} = 4$$

$$\sigma = \sqrt{V(x)} = \sqrt{\alpha/\lambda^2} = \sqrt{8} = 2\sqrt{2}$$

ii)

$$iii) \quad F_x(x) = \int_0^x \frac{\lambda^\alpha e^{-\lambda x} x^{\alpha-1}}{\Gamma(\alpha)} dx$$

$$= \int_0^x \frac{(1/2)^2 e^{-x/2} x^1}{\Gamma(2)} dx$$

$$= \left(\frac{1}{2}\right)^2 \int_0^x e^{-x/2} x dx$$

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

$$Q4) P(\text{at least one female}) = \frac{8C_2}{18C_2} + \frac{8C_1 \times 10C_1}{18C_2}$$

$$= 0.70588 = \frac{108}{18C_2}$$

$$P(2 \text{ qualified female}) = \frac{7C_2}{18C_2}$$

$$\therefore P(2 \text{ qualified female} / \text{at least one female}) = \frac{7C_2}{18C_2}$$

$$\frac{21}{108} = 0.194444$$

$$\frac{108}{18C_2}$$

$$Q5) P(L | V_2) = \frac{P(V_2 | L) P(V_2)}{P(V_2 | L) P(V_2) + P(V_1 | L) P(V_1) + P(V_3 | L) P(V_3)}$$

$$= \frac{0.40 \times 0.50}{0.40 \times 0.50 + 0.40 \times 0.20 + 0.10 \times 0.10}$$

$$= \boxed{0.69}$$

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

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

$$= 3.25$$

$$V(x) = (1)^2(0.05) + (2)^2(0.15) + (3)^2(0.35) + (4)^2(0.4) + (5)^2(0.05) - (E(x))^2$$

$$= 20.7 - 30.25$$

$$= 11.45 - 10.5625$$

$$= 0.8875$$

Q11)

Q11)

Q9) a This case is following binomial distribution,

$$p = 0.01$$

$$q = 0.99$$

$$n = 7$$

$$x = 3$$

$$P = {}^n C_x p^x q^{n-x}$$

$$= {}^7 C_3 (0.01)^3 (0.99)^{7-3}$$

$$= 3.362 \times 10^{-5}$$

Q13)

Q10) This is following poisson distribution with $\lambda = 2/5$

$$P(x > 2) = 1 - P(x \leq 2)$$

$$P(x) = \frac{e^{-\lambda} \lambda^x}{x!}$$

$$P(0) = e^{-0.4} = 0.670320046$$

$$P(1) = 0.268128018$$

$$P(2) = 0.053625804$$

$$P(x > 2) = 1 - 992073668$$

$$= 0.007926332$$

Q11)

Q11) following binomial distribution

$$p = 1/2 \quad \therefore q = 1/2$$

$$\begin{aligned} P(X=3) &= {}^3C_3 \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)^0 \\ &= \frac{1}{8} \end{aligned}$$

Q13) ~~$X \sim U(0,10)$~~ $X \sim U(75, 120)$

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

$$\begin{aligned} P(80 < X < 100) &= \frac{100-80}{45} = \frac{20}{45} \\ &= 0.44444 \end{aligned}$$

Q14) $X \sim \text{Gamma}(5, 0.4)$ $P(X < 22.89)$

$$P(X < 22.89) = 1 - P(X > 22.89)$$