

Assignment #1

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Q.1)

part i, Stem & Leaf Plots

5 | 1, 4, 5, 7, 7

6 | 0, 0, 2, 3, 4, 6, 6, 6, 6, 7, 8, 8

7 | 0, 0, 0, 1, 1, 2, 3, 4, 6, 7, 7, 8, 8, 8, 9

8 | 0, 1, 1, 3, 5, 8

9 | 0, 6, 8

⇒ here, total values (n) = 41

part ii, Five-No. Summary:

min = 51, max = 98

$$Q_1 = \left(\frac{n+1}{4} \right)^{\text{th}} \text{ value} = \left(\frac{41+1}{4} \right)^{\text{th}} \text{ value} = 10.5^{\text{th}} \text{ value} =$$

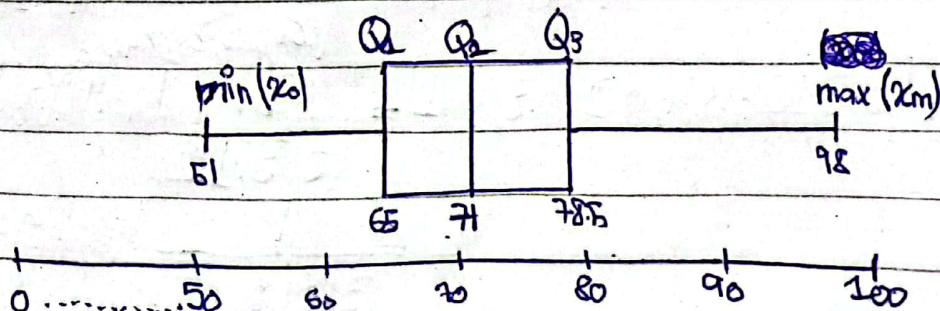
$$= Q_1 = 10^{\text{th}} + 0.5(11^{\text{th}} - 10^{\text{th}}) = 64 + 0.5(66 - 64) = 65 \text{ Ans}$$

$$Q_2 = \left(\frac{n+1}{2} \right)^{\text{th}} \text{ value} = \left(\frac{41+1}{2} \right)^{\text{th}} \text{ value} = 21^{\text{st}} \text{ value} = 71 \text{ Ans}$$

$$Q_3 = 3 \left(\frac{n+1}{4} \right)^{\text{th}} \text{ value} = 3 \left(\frac{41+1}{4} \right)^{\text{th}} \text{ value} = 31.5^{\text{th}} \text{ value}$$

$$= Q_3 = 31^{\text{st}} + 0.5(32^{\text{nd}} - 31^{\text{st}}) = 78 + 0.5(79 - 78) = 78.5 \text{ Ans}$$

Box-Plots



19k-0273

(2)

part iv, S.D(σ) = $\sqrt{\frac{\sum x^2}{n} - (\bar{x}(\text{mean}))^2}$

$$= \sqrt{\frac{216508}{41} - (71.8537)^2} \quad (\text{using calculator})$$

$$\Rightarrow (\text{S.D})\sigma = 10.851 \quad \text{Ans}$$

part v, No Outliers. Ans

Q.2) $P = P(L_1) + P(L_2) + P(L_3) + P(L_4)$

$$= (0.4)(0.2) + (0.3)(0.1) + (0.2)(0.5) + (0.3)(0.2)$$

$$= 0.27 \quad \text{Ans}$$

~~part b~~ Q.2) part a,

$$\therefore P = P(L_1) + P(L_2) + P(L_3) + P(L_4) \quad [\because \text{mutually exclusive case}]$$

$$= (0.4)(0.2) + (0.3)(0.1) + (0.2)(0.5) + (0.3)(0.2)$$

$$\Rightarrow P = 0.27, \text{Ans}$$

part b, Givens

$n=9$, 4 outcomes, $p_1=0.4$, $p_2=0.2$, $p_3=0.3$, $p_4=0.1$,

$x_1=3$, $x_2=3$, $x_3=1$, $x_4=2$

(for 4 outcomes)

$$\therefore P(x_1, x_2, x_3, x_4; p_1, p_2, p_3, p_4) = \binom{n}{x_1, x_2, x_3, x_4} p_1^{x_1} p_2^{x_2} p_3^{x_3} p_4^{x_4}$$

$$\Rightarrow P(3, 3, 1, 2; 0.4, 0.2, 0.3, 0.1) = \binom{9}{3, 3, 1, 2} (0.4)^3 (0.2)^3 (0.3)^1 (0.1)^2$$

$$= \frac{9!}{3!3!1!2!} (0.064)(0.008)(0.3)(0.01)$$

$$= 0.00774 = 7.74 \times 10^{-3}, \text{Ans}$$

191k-0273

(3)

part c, $P(X=0) (1/2)$
 $= {}^3C_0 (1/2)^3 (1/2)$
 $= 0.0625 \text{ Ans}$

Q.3) part a, Given

~~200/32~~, boys = 19, girls = 13, n(total) = 19 + 13 = 32

So,

$$P(\text{boys}) = \frac{19}{32} = 0.59, P(\text{girls}) = \frac{13}{32} = 0.41$$

part b, Sol: $6 \times 7 \times 7$
 $= 294 \text{ Ans}$

part d i, $28/200 = 0.14 \text{ Ans}$

ii, $95/200 = 0.475 \text{ Ans}$

Q.4) ~~Given~~ 48, 49, 59, 59, 61, 63, 66, 67, 70, 72, 74, 74, 77, 81, 82

i	x_i	$x_i - \bar{x}$	$ x_i - \bar{x} $	i	x_i	$x_i - \bar{x}$	$ x_i - \bar{x} $
1	63	60 -20.368	20.368	10	102	18.632	18.632
2	229	80 145.632	145.368	11	81	-2.368	2.368
3	165	81.632	81.632	12	72	-11.368	11.368
4	77	-6.368	6.368	13	89	24.368	24.368
5	49	-34.368	34.368	14	74	-9.368	9.368
6	74	-9.368	9.368	15	61	-22.368	22.368
7	67	-16.368	16.368	16	82	-1.368	1.368
8	59	-24.368	24.368	17	48	-35.368	35.368
9	66	-17.368	17.368	18	70	-13.368	13.368
				19	86	2.632	2.632

19k-0273

(4)

Q.4 continued)

So, $n_i = 19$, $\sum x = 1584$, $\bar{x} (\text{mean}) = 1584/19 = 83.368$,
 $\sum |x_i - \bar{x}| = 496.784$, $\sum x^2 = 165918$, $\sigma = \sqrt{\frac{165918}{19} - (83.368)^2}$

$\Rightarrow \sigma = 42.2173$, median $(\tilde{x}) = 72$

part i, M.A.D. = $\frac{\sum |x_i - \bar{x}|}{n_i} = \frac{496.784}{19} = 26.147$ Ans

part ii, Pearsonian Skewness = $\frac{(\bar{x}) - (\tilde{x})}{\sigma (\text{S.D})}$

$= \frac{(83.368 - 59)}{42.2173}$

part ii, Pearsonian Skewness = $\frac{3(\bar{x}) - 3(\tilde{x})}{\sigma (\text{S.D})}$

$= \frac{3(83.368 - 72)}{42.2173}$

$= 0.808$ Ans

part iii, $Q_1 = 61$, $Q_2 (\text{median}) = 72$, $Q_3 = 82$ (using calc.)

\therefore Quartile Coefficient of Skewness = $\frac{Q_3 + Q_1 - 2Q_2}{Q_3 - Q_1}$

$= \frac{82 + 61 - 2(72)}{82 - 61}$

$= -0.048$ Ans

part iv, $Q_1 = 1.5(Q_3 - Q_1) = 1.5(82 - 61) = 31.5$
 $- Q_3$

19k-0273

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part iv (Continued Q.4)

$$I.Q.R = Q_3 - Q_1 = 21$$

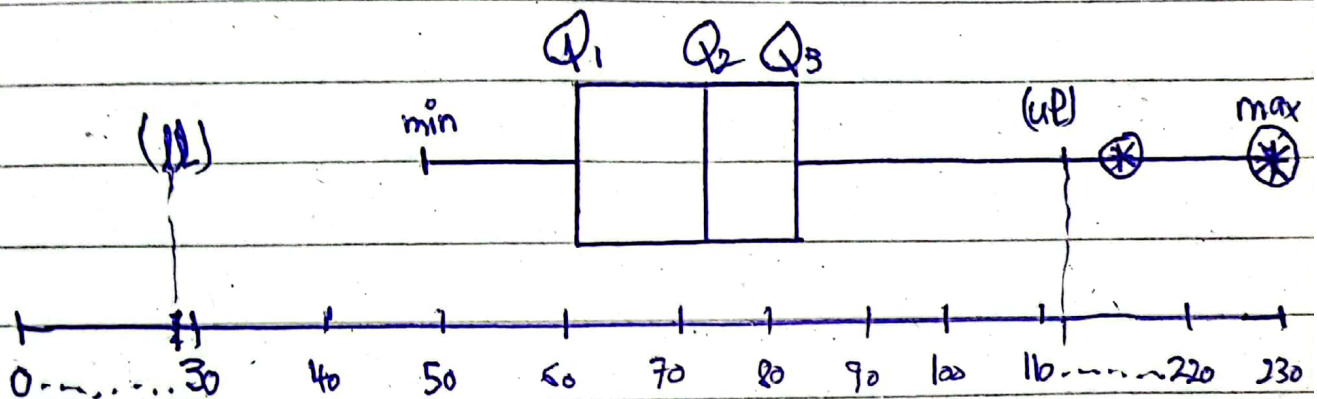
$$\therefore \text{lower limit} = Q_1 - 1.5(I.Q.R) = 61 - 1.5(21) = 29.5$$

$$\therefore \text{upper limit} = Q_3 + 1.5(I.Q.R) = 82 + 1.5(21) = 113.5$$

part v, Outliers:

Hence, 165, 229 are outliers. Ans

Part vi, Wisker Plot:



$$Q.5) \text{ Given } \therefore B_2 = \frac{u_4}{u_2^2} = \frac{(1.24)}{(0.84)^2} = 1.757 \text{ Ans}$$

$$\therefore B_1 = \frac{u_3^2}{u_1^3} = \frac{(0.36)^2}{(0.84)^3} = 0.219 \text{ Ans}$$

Q.6) ~~part vi~~ Note: This Question is same as Q.3.