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Prob. Assignment #01

Question 1

Q1 $\Sigma x = 12020.9$ $(n)f = 90$. $\Sigma x^2 = 1605998.67$

Mean (μ) $= \frac{12020.9}{90} \Rightarrow \boxed{133.567}$

Median $= \frac{n}{2}$ & $\frac{n+2}{2} \Rightarrow \frac{90}{2}$ & $\frac{92}{2} \Rightarrow$ 45th & 46th

$= \frac{1}{2}[134 + 134] \Rightarrow \boxed{134}$

Mode $= \boxed{135.8}$ (Appeared 5 times)

$$\text{variance } (\sigma^2) = \frac{\Sigma x^2 - \frac{(\Sigma x)^2}{N}}{N}$$

$$= \frac{1605998.67 - \frac{(12020.9)^2}{90}}{90}$$

$\Rightarrow \boxed{4.672}$

Standard deviation $\sigma = \sqrt{\sigma^2}$

$= \sqrt{4.672}$

$\Rightarrow$ ~~2.1736~~ $\boxed{2.16}$

$Q_1 = 1\left(\frac{n+1}{4}\right) = \frac{91}{4} = 22.75$

$= 22nd + (23rd - 22nd) * 0.75.$

$= 132.5 + (132.5 - 132.5) * 0.75$

$= \boxed{132.5}$

$Q_2 = 2\left(\frac{90+1}{4}\right) = \frac{91}{2} = 45.5$ th.

45th + 0.5 * (46th − 45th)

134 + 0.5 * (134 − 134)

=> 134

$Q_3 = 3\left(\frac{91}{4}\right)$ => 68.25th

68th + 0.25 * (69th − 68th)

139.4 + 0.25 (0)

=> 135.4

Max = 136.4

Min = 127.5

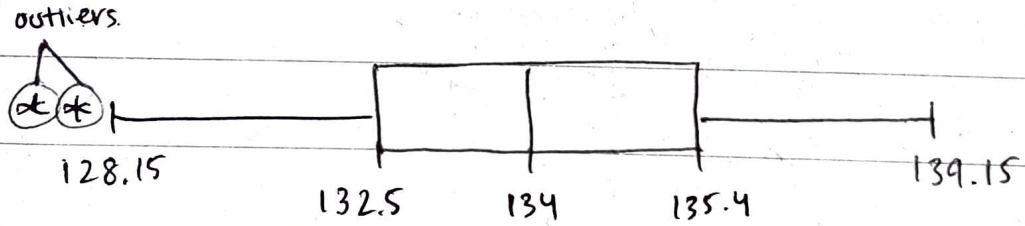
Range = 8.9

$IQR = Q_3 - Q_1 = 135.4 - 132.5$

$= 2.95$

~~outlier = ∅~~

Box & whisker

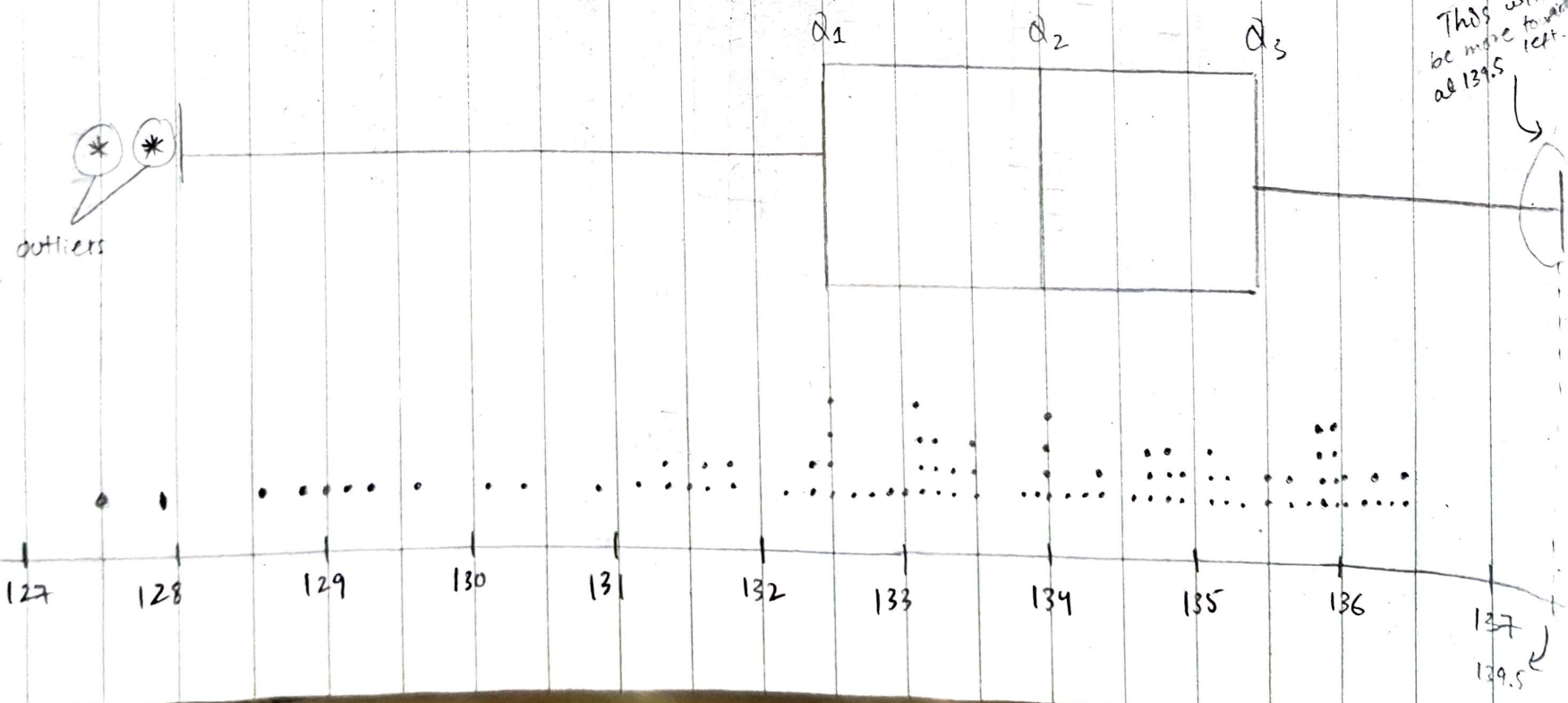


outliers = 127.5 , 127.9

ORDERED STEM & LEAF

Stem	Leaf
127	.5 .9
128	.6 .8
129	.0 .2 .4 .6
130	.2 .4 .8
131	.3 .4 .4 .5 .6 .6 .8 .8
132	.3 .4 .4 .5 .5 .5 .5 .6 .7 .9
133	.0 .1 .1 .1 .1 .2 .2 .2 .3 .3 .5 .5 .5 .8 .9
134	.0 .0 .0 .0 .1 .2 .3 .4 .4 .6 .7 .7 .7 .8 .8 .8 .9 .9
135	.2 .2 .2 .3 .3 .4 .5 .5 .6 .6 .7 .8 .8 .8 .8 .8 .9 .9 .9 .9
136	.0 .0 .1 .2 .2 .3 .4 .4

BOX & WHISKERS



DOT PLOT

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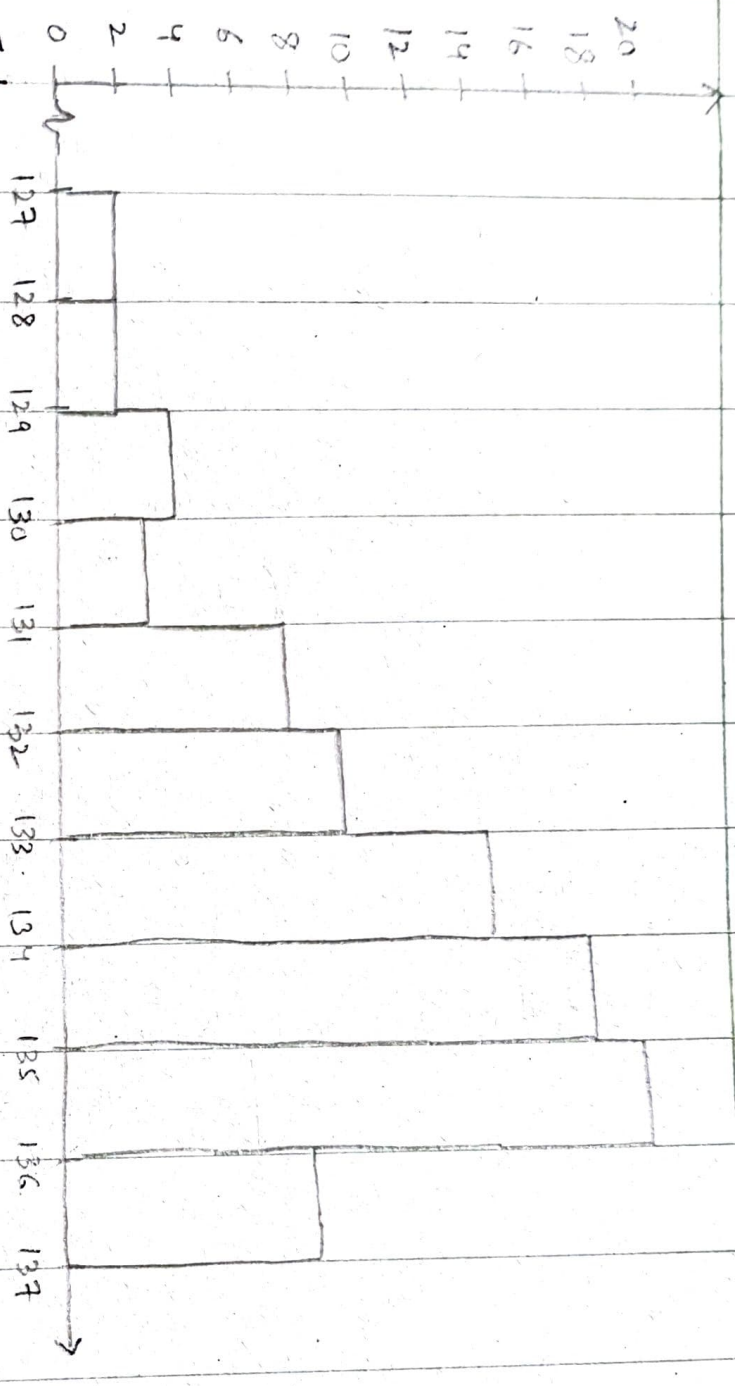
Histogram

⊛ Behaviour of box plot and histogram



The data is left skewed in both because the measure of central tendency is

$$\text{Mean} < \text{Median} < \text{Mode}$$

⊛ Trimmed mean.

$$90 \times \frac{20}{100} = 18 \text{ values.}$$

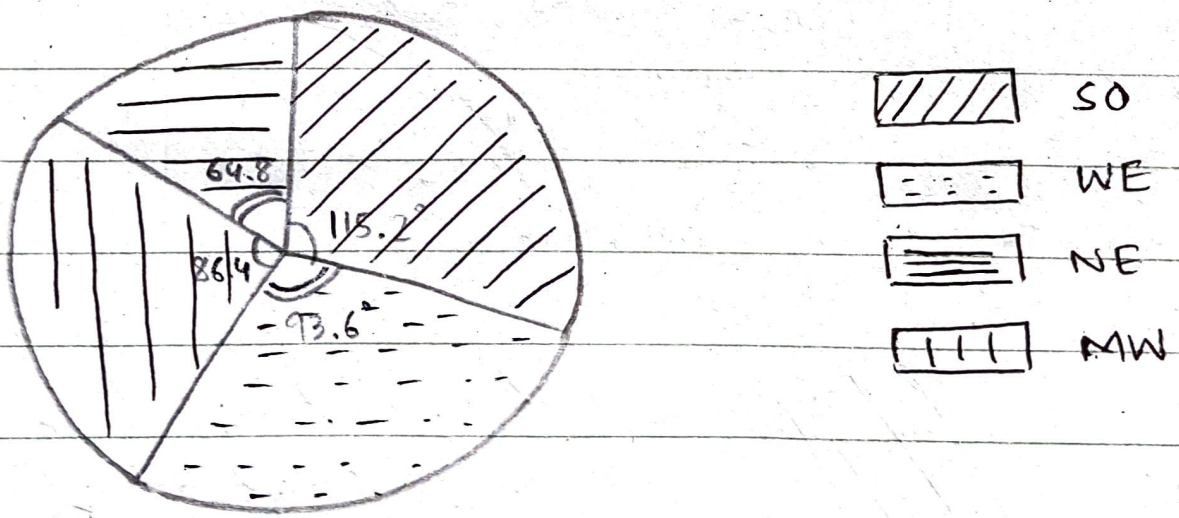
from both sides

$$M_T = \frac{\Sigma X}{N \leftarrow 54}$$

$$M_T = 133.9$$

Q2.

Data	Frequency	Relative frear.
SO	16	0.32
WE	13	0.26
NE	9	0.18
MW	12	0.24
	$\Sigma f = 50$	



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Q3.

(a) outcome : anxiety anxiety.

=> simple event.

(b) outcome : (anxiety & no) || (no & anxiety)

=> compound event.

(c) outcome : no & anxiety

=> simple event.

(d) outcome : no & no.

=> simple event.

Q4.

T. Outcomes = m^n

= $(2)^3$

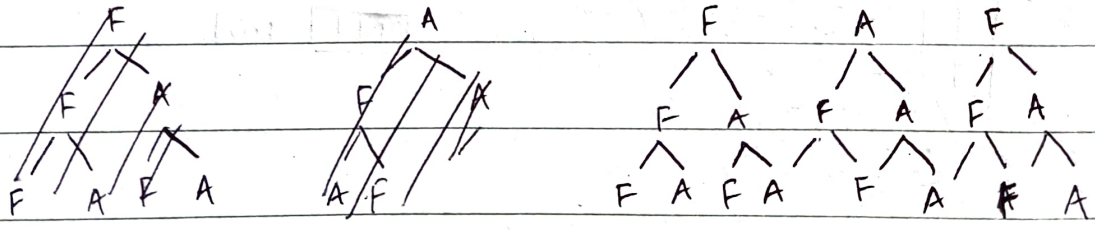
= 8

m = no. of options.

n = no. of people.

2 options ↗ For (F) ↘ Against (A)

FFF, FFA, FAF, FAA, AFF, AFA, AAF, AAA.



Q5.

(a) 7400 / 15000 = 0.4933

(b) 4600 / 15000 = 0.3067

(c) 3000 / 15000 = 0.2

(d) As we considered all possible reasons for loosing the job and all reasons are mutually exclusive therefore the probabilities of these three events add up to 1.0.

Q6. { 1, 2, 3, 4, 5, 6 }

$P(<=8) = P(1,1) + P(1,2) + P(1,3) + P(1,4) + P(1,5) + P(1,6)$

$+ P(2,1) + P(2,2) + P(2,3) + P(2,4) + P(2,5) + P(2,6)$

$+ P(3,1) + P(3,2) + P(3,3) + P(3,4) + P(3,5)$

$+ P(4,1) + P(4,2) + P(4,3) + P(4,4)$

$+ P(5,1) + P(5,2) + P(5,3) + P(5,4)$

$+ P(6,1) + P(6,2) +$

Total = 36

$\Rightarrow \frac{26}{36}$

$\Rightarrow \boxed{13/18}$

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outcome ↗ H ↘ T (2)

no. of times (n) → (4)

Total = $2^4 = 16$

Q7. P(2 heads)

HHTT HTHT THTH TTHH HTTH THHT

$P(\text{2 heads}) = \frac{6}{16} = \boxed{0.375}$

Q8. P(Atmost 2 heads) Total = $2^4 = 16$.

TTTT TTTH TTHT TTHH THTT THTH

THHT HTTT HTTH HTHT HHTT

$\Rightarrow \boxed{\frac{11}{16}}$

Q9.

(a)

P(defective & day shift) = $3/100 = \boxed{0.3}$

(b) P(defective) + P(day shift) − P(defective ∩ day shift)

$8/100 + 5/100 - 3/100 = \boxed{55/100} \Rightarrow 11/20$

(c) $P(\text{defective} \mid \text{day shift}) = \frac{P(\text{defective} \cap \text{dayshift})}{P(\text{day shift})}$

$= \frac{3/100}{50/100} = \boxed{3/50}$

Q10. ~~P(M) =~~

$M = 54$
$H = 69$
$M \cap H = 35.$

(a) P (M or H)

P(Math or History) = $P(M) + P(H) - P(M \cap H)$.

$= \frac{54}{100} + \frac{69}{100} - \frac{35}{100} \Rightarrow \frac{88}{100}.$

$\Rightarrow \boxed{0.88}$

(b) P(neither)

$1 - P(M \text{ or } H)$.

$1 - 0.88 \Rightarrow \boxed{0.12}$

(c) P(only history)

$= P(H) - P(M \cap H)$

$= \frac{69}{100} - \frac{35}{100} \Rightarrow \boxed{\frac{34}{100}} \Rightarrow 0.34$

Q11.

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= P(A) + P(B) - P(A) \cdot P(B)$

$= 0.3 + 0.6 - (0.3 * 0.6)$

$= 0.9 \quad -0.18$

$\Rightarrow \boxed{0.72}$

Q12. $P(A) = 0.25$ $P(B) = 0.33$ $P(A \cup B) = 0.43$.

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A \cap B) = 0.25 + 0.33 - 0.43$

$\boxed{P(A \cap B) = 0.15}$

$P(B|A) = \frac{P(A \cap B)}{P(A)}$

$= 0.15 / 0.25$

$\Rightarrow \boxed{0.6}$