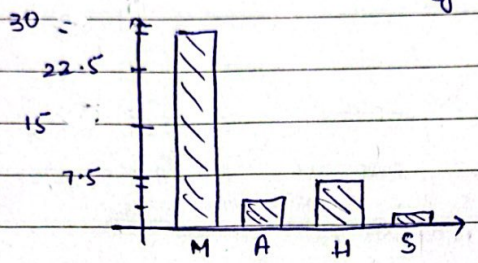
Sarita Sangvez
23i - 2088
CY-A.

Robability And Statistics
Assignment 01.

Q1.

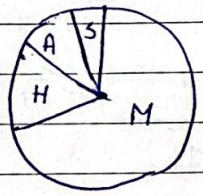
a), b), c)

Classes	Tallys	Freq.	Rel. Freq.
M	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	28	0.7
A	𝍸	4	0.1
H	𝍸 I	6	0.15
S	II	2.	0.05
		$\Sigma f = 40$	



M = 0.7 x 100 = 70%. , A = 0.1 x 100 = 10%. , H = 0.15 x 100 = 15%.

S = 0.05 x 100 = 5%.



Q2.

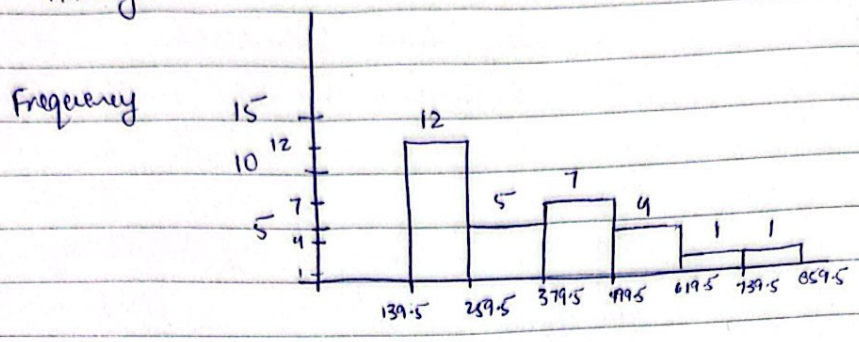
a). No. classes = $1 + \frac{33}{3.3}\log(30) = 5.9 \approx 6$.

Range = 857 - 140 = 717

Class width = 717/6 = 119.5 ≈ 120.

	Class Interval	Freq.	Midpoint /x	C.F	Tally
1.	140 - 259	12	199.5	12	𝍸 𝍸 II
2.	260 - 379	5	319.5	17	𝍸
3.	380 - 499	7	439.5	24	𝍸 II
4.	500 - 619	4	559.5	28	1111
5.	620 - 739	1	679.5	29	I
6.	740 - 859	1	799.5	30	I
		$\Sigma f = 30$			

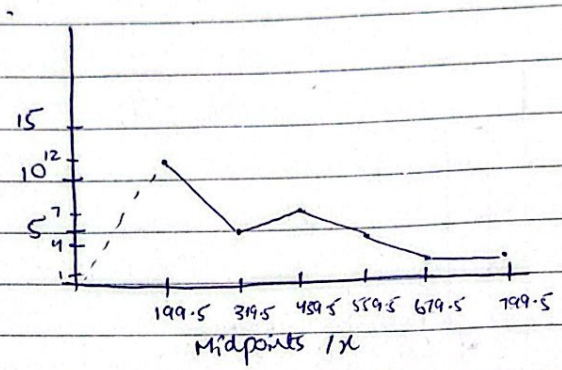
Histogram.



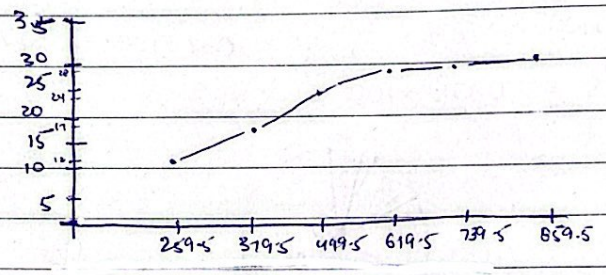
C.B.

139.5 - 259.5
259.5 - 379.5
379.5 - 499.5
499.5 - 619.5
619.5 - 739.5
739.5 - 859.5

b) Freq. polygon.



c) Ogive cumm freq.



Q3. Sort : 78 80 87 88 97 101 101 103 106. 110

a) Arithmetic Mean.

$= (78 + 80 + 87 + 88 + 97 + 101 + 101 + 103 + 106 + 110) / 10 \Rightarrow 95.1.$

Median pos $= (10+1)/2 = 5^{th}$ and 6^{th}

$(97 + 101)/2 = 99.$

Mode = 101

b) Range = 110 - 78 = 32.

Variance (sample.) $= \frac{\Sigma (x - \bar{x})^2}{n-1}$

$x - \bar{x} = 78 - 95.1 = -17.1, -15.1, -8.1, -7.1, 1.9, 5.9, 5.9, 7.9, 10.9, 14.9.$

$(-17.1)^2$ - 292.41 , 228.01 , 65.61 , 50.41 ,
3.61 , 34.81 , 34.81 , 62.41 , 118.81 ,
222.01.

$\Sigma (x - \bar{x})^2 = 1078.09.$

$6^2 = \frac{1078.09}{10-1} = 119.8.$

S.D = $6 = 10.9.$

c). (78 + 80 + 87 + 88 + 97 + 101 + 101 + 103 + 106 + 110 + 10 x 10) / 10 = 105.1 ⇒ Mean.

X	X-$\bar{X}$
88	-17.1
90	-15.1
97	-8.1
98	:
107	:
111	:
111	:
113	:
116	:
120	

The standard dev will remain the same.
6 = 10.9.

d). (156 + 160 + 174 + 176 + 194 + 214 + 214 + 206 + 212 + 220) / 10 = 192.6.

X	x - $\bar{x}$	$(x-\bar{x})^2$	$\Sigma(x-\bar{x})^2$
156	-36.6	1339.56	5248.4.
160	-32.6	1062.76	
174	-18.6	345.96	
176	-16.6	275.56	
194	1.4	1.96	
214	21.4	457.96	
214	21.4	457.96	
206	13.4	179.56	
212	19.4	376.36	
220	27.4	750.76	

$6^2 = \frac{5248.4}{10-1}$

= 583.

S.D

= 6 = 24.14.

$V(ax+b) = a^2 V(x)$.

e) $V(2X+5)$

5 is constant so does not affect variance.

$V(X) = 119.8$.

so $V(2X+5) = 4\,V(X)$

$= 4 \times 119.8 = 479.2$.

$S.D(5X-3) = 5\,S.D(X)$

$= 5 \times 10.9 \Rightarrow 54.5$.

Q4. 11, 51, 58, 61, 65, 67, 72, 73, 75, 78, 80, 97.

a) $Q_1 = \left(\frac{n+1}{4}\right)^{th} = 13/4 = 3.25^{th}$ 3rd and 4th.

$58 + 61/2 = 59.5$

Q_2 = Median $= \left(\frac{13}{2}\right)^{th} = 6.5^{th}$ 6th and 7th

$(67 + 72)/2 = 69.5$

$Q_3 = \frac{13}{4} \times 3 = 9.75 = 9^{th}$ and 10^{th}

$= 75 + 78/2 = 76.5$.

$IQR = 76.5 - 59.5 = 17$.

1.5 IQR $\Rightarrow$ 25.5

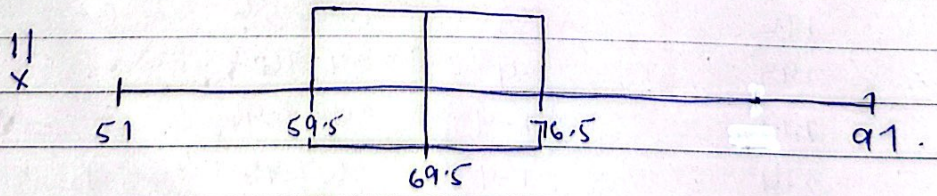
Fences : $59.5 - 25.5 = 34$

$76.5 + 25.5 = 102$.

c) 11 is an outlier.

Min : 51 , Max : 91.

d)



b) $D5 = 5\left(\frac{n+1}{10}\right)^{th} = \frac{13}{10} \times 5 = 6.5^{th}$

6th and 7th

$D5 = 69.5$

P 43 :- $43 \times \frac{13}{100} \Rightarrow 5.6^{th}$ 5th and 6th

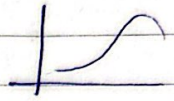
$\frac{65+67}{2} = 66$.

e). Median $= \frac{Q_1 + Q_3}{2} = \frac{59.5 + 76.5}{2} = 68.$

$Q_1+Q_3/2$ Mean $= 68.$

$68 < 69.5$

slightly negatively / left skewed.



Q5. Mean of Calculus.

a) $= 962/15 = 64.06 \approx 64.1$

Mean of L.A $= 1189/15 = 79.3.$

Calculus :

	X	$X - \mu$	$(X-\mu)^2$	$\Sigma(x-\mu)^2$
1	52	-12.1	146.41	1990.95
2	58	-6.1	37.21	So $6^2 = 1990.95/15$
3	59	-5.1	26.01	$= 132.73.$
4	60	-4.1	16.81	S.D
5	62	-2.1	4.41	$= 6 = 11.52.$
6	65	0.9	0.81	
7	67	2.9	8.41	C Var $= \frac{6}{\mu} \times 100$
8	68	3.9	15.21	$= \frac{11.5}{64.1} \times 100 = 17.97\%$
9	70	5.9	34.81	
10	71	6.9	47.61	
11	75	10.9	118.81	
12	78	13.9	193.21	
13	80	15.9	252.81	
14	96	31.9	1071.61	
15	60	-4.1	16.81	

L.A :

51, 63, 65, 70, 71, 72, 75, 76, 78, 85, 87, 88, 90, 91, 97.

$X - \mu$: -28.27, -16.27, -14.27, -9.27, -8.27, -7.27, -4.27, -3.27, -1.27, 5.73, 7.73, 8.73, 10.73, 11.73, 17.73

$(X-\mu)^2$: 799.23, 264.67, 203.67, 85.93, 68.4, 52.8, 18.23, 10.67, 1.61, 32.87, 59.73, 76.23, 115.2, 137.6, 314.33

$\Sigma (x-M)^2 = 2240.$

$6^2 = 149.33.$

$6 = \sqrt{149.33} = 12.22.$

$CVar = \frac{12.22}{79.27} \times 100 = 15.42\ \%$

Calculus data set has more relative variance.

b). Calculus :

$Q_1 = \left(\frac{n+1}{4}\right)^{th} = \frac{16}{4} = 4^{th} = 60.$

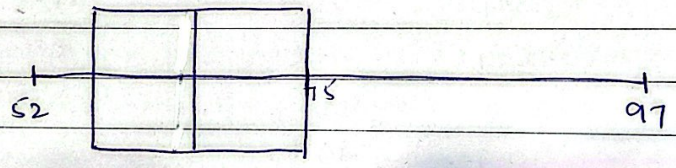
$Q_2 = \left(\frac{n+1}{2}\right)^{th} = \frac{16}{2} = 8^{th} = 67.$

$Q_3 = 3 \times \frac{16}{4} = 12^{th} = 75.$

$IQR = 75 - 60 = 15$

$1.5\ IQR = 22.5.$

$Q_1 - 22.5$, $Q_3 + 22.5$ } Fences → 37.5, 97.5



L.A : $Q_1 = \frac{16}{4} = 4^{th} = 70.$

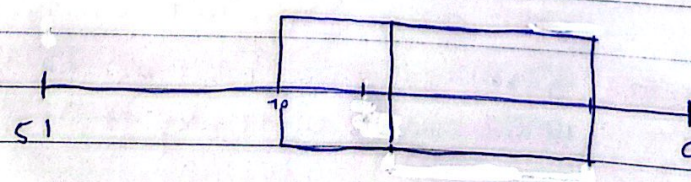
$Q_2 = \frac{16}{2} = 8^{th} = 76.$

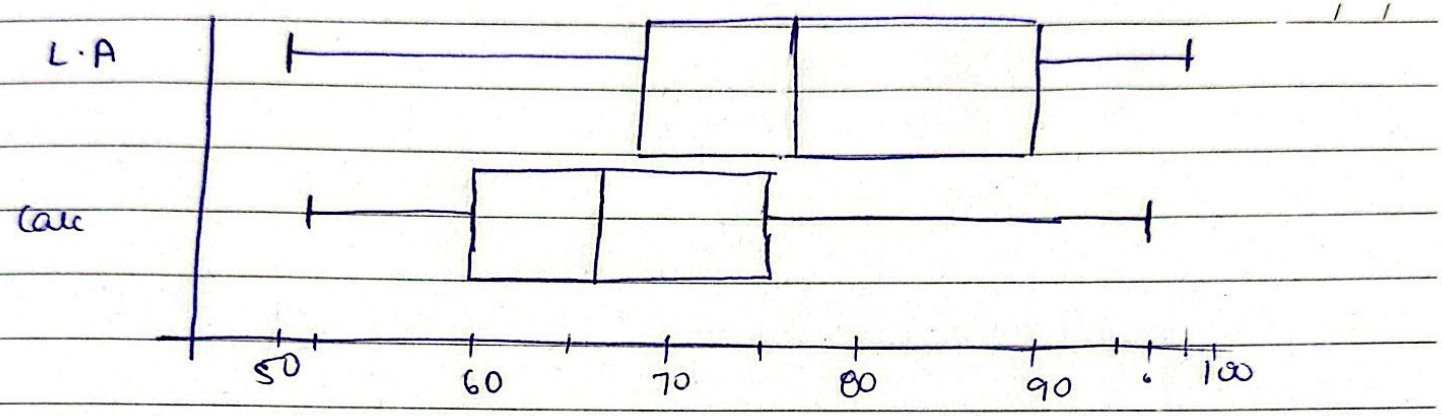
$Q_3 = 12^{th} = 88$

$IQR = 88 - 70 = 18.$

$1.5\ IQR = 27.$

$Q_1 - 27$, $Q_3 + 27$ } Fences → 43, 115.





Students performed better in L.A as avg / mean is higher and Q3 is also higher.