sec J, serial 25
0112230556
Tanjil hasan sawan

Ans. no - 1

Q_1

Ranked by Ex (1) $\{x\}$	Ranked by Ex (2) $\{y\}$	$d = x - y$	d^2
7	9	-2	4
9	5	4	16
1	1	0	0
3	4	-1	1
8	6	2	4
4	7	-3	9
10	8	2	4
5	2	3	9
6	10	-4	16
2	3	-1	1

$\Sigma d^2 = 64$

$$R = 1 - \frac{6\Sigma d^2}{n(n^2-1)}$$

$$= 1 - \frac{6 \times 64}{10(10^2-1)}$$

$$= 0.61$$

There exists a strong positive relationship

Ans. no - 2

Q_2

Experience in Years (X)	Average Annual Sales (Y)	X^2	Y^2	XY
1	80	1	6400	80
3	97	9	9409	291
4	~~92~~ 92	16	8464	368
4	102	16	10404	408
6	103	36	10609	618
8	111	64	12321	888
10	119	100	14161	1190
10	123	100	15129	1230
11	117	121	13689	1287
13	136	169	18496	1768
$\Sigma x = 70$	$\Sigma Y = 1080$	$\Sigma X^2 = 632$	$\Sigma Y^2 = 119082$	$\Sigma XY = 8128$

a) Regressionline of y on x

$$a = \frac{\Sigma y \Sigma x^2 - \Sigma x \Sigma xy}{n \Sigma x^2 - (\Sigma x)^2}$$

$$= \frac{1080 \times 632 - 70 \times 8128}{10 \times 632 - (70)^2}$$

$$= 80$$

$$b = \frac{n \Sigma xy - \Sigma x \Sigma y}{n \Sigma x^2 - (\Sigma x)^2}$$

$$= \frac{10 \times 8128 - 70 \times 1080}{10 \times 632 - (70)^2}$$

$$= 4$$

$$y = a + bx$$

$$= 80 + 4x$$

(Ans)

(b)

For $x = 12$

$Y = 80 + 4.(12)$

$= 128$

For $x = 15$

$Y = 80 + 4.(15)$

$= 140$

(Ans)

3,4

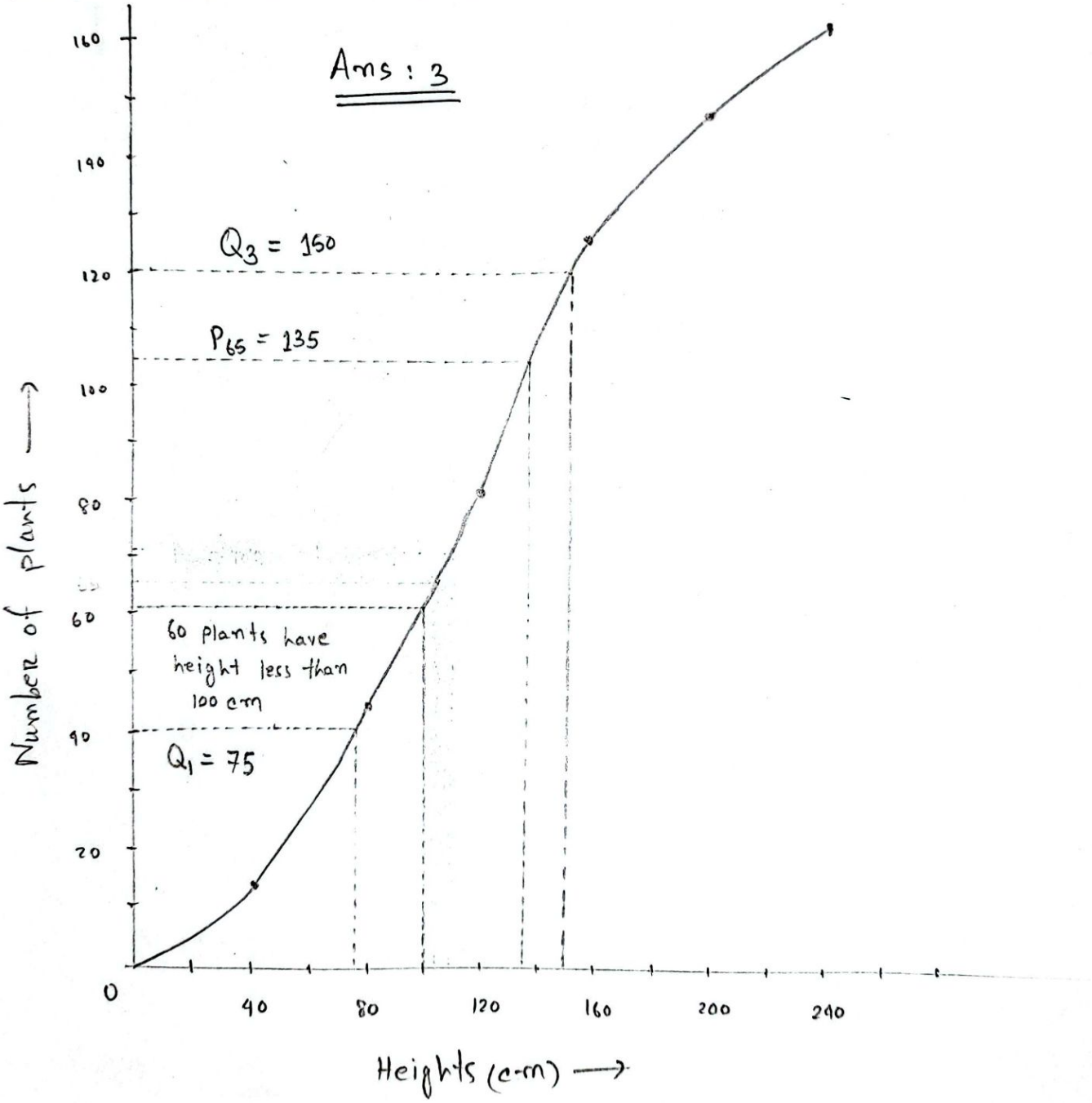
(From Mid review math)

ID: 0112230050

MD. Minhajur Rahman

Section : j

Serial : 13



(a)

From the graph, 60 plants have heights less than 100cm

b. $P_{65} = \frac{iN}{100} = \frac{65 \times 160}{100} = 104$th value

$= 135$

(c)

$Q_1 = \frac{iN}{4}$

$= \frac{160}{4}$

$= 40$ th value ≈ 75

$Q_3 = \frac{iN}{4}$

$= \frac{3 \times 160}{4}$

$= 120$ th value ≈ 150

$\therefore IQR = (Q_3 - Q_1)$

$= (150 - 75)$

$= 75$

Ans : 4

~~Amazons : 205 198 181 182 190 215 178 202 196 184~~

~~Giants~~

Amazons	205	198	181	182	190	215	201	178	202	196	184
Giants	175	182	184	187	189	192	193	195	195	195	209

For Amazons (Sorted : 178, 181, 182, 184, 190, 196, 198, 201, 202, 205, 215)

$$Q_1 = \frac{i(n+1)}{4}$$

$$\Rightarrow \frac{11+1}{4} = 3rd \therefore 182$$

$$Q_2 = \frac{i(n+1)}{4}$$

$$= \frac{2(11+1)}{4} = 6th \therefore 196 \text{ (median)}$$

$$Q_3 = \frac{i(n+1)}{4}$$

$$= \frac{3(11+1)}{4} = 9th \therefore 202$$

Range = 215 - 178 = 37

IQR = $Q_3 - Q_1$ = 202 - 182 = 20

For Giants:

Sorted : 175, 182, 184, 187, 189, 192, 193, 195, 195, 195, 204

$Q_1 = \frac{i(n+1)}{4}$

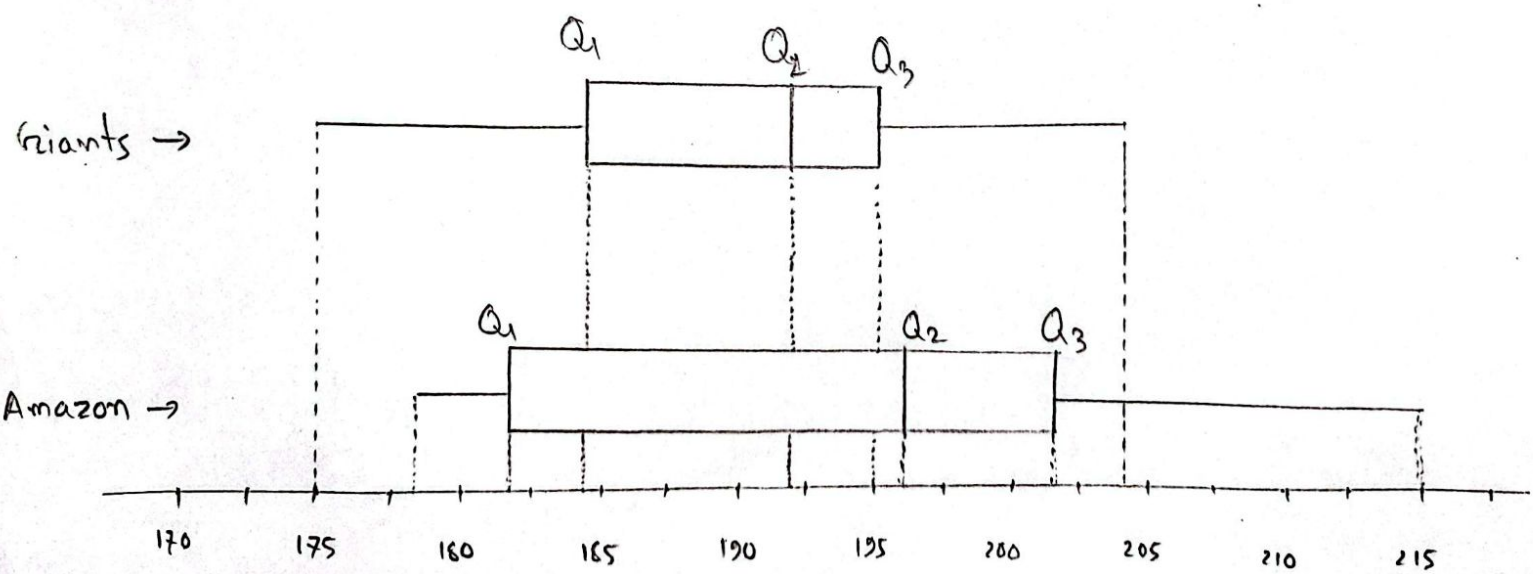
$= 3rd \therefore 184$

$Q_2 = \frac{2(n+1)}{4} = 6th \therefore 192$ (median)

$Q_3 = \frac{3(n+1)}{4} = 9th \therefore 195$

$\therefore$ Range $= 204 - 175 = 29$

$\therefore IQR = Q_3 - Q_1 = 195 - 184 = 11$



Fahim Niloy
01123103 07

Answer the question no 5

a) Rebels:

75, 78, 79, 80, 82, 82, 83, 84, 85, 86, 89, 93, 95
99, 102.

$n = 15$

$\therefore$ median $= \left(\frac{n+1}{2}\right)^{th}$

$= \left(\frac{15+1}{2}\right)^{th}$

$= \left(\frac{16}{2}\right)^{th}$

$= 8^{th}$

$= 84$

Median $= 84$

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

$= \frac{15+1}{4} \times 1$

$= \frac{16}{4} = 4^{th}$

$= 80$

$Q_3 = \left(\frac{n+1}{4} \times 3\right)^{th}$

$= \frac{16}{4} \times 3$

$= 4 \times 3$

$= 12^{th}$

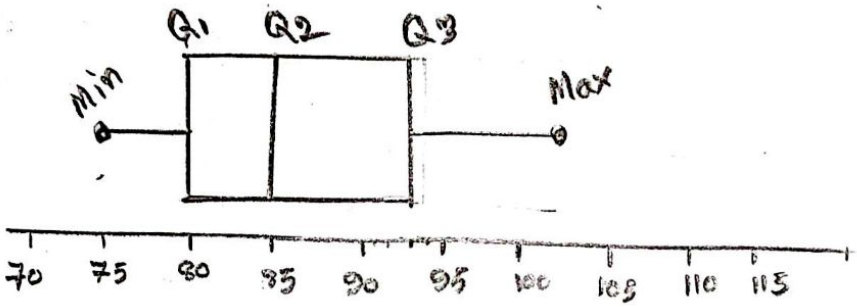
$= 93$

$\therefore IQR = Q_3 - Q_1 = 93 - 80$

$= 13$

b) $Q_1 = 80$, $Q_3 = 93$, Minimum = 75, Maximum = 102

Q_2 = median = 84



c) Rebels Median = 84, Rebels IQR = 13

Sharks: 66, 68, 71, 72, 74, 75, 75, 76, 78, 83, 83, 84, 84, 85, 86, 92

Sharks Median $= \left(\frac{15+1}{2}\right)^{th}$

$= 8th$

$= 76$

The Rebels have a higher median weight (84 kg) compared to the Shark's median (76 kg).

Answer the question no 6

a) Team A:

Mean: 3.15 → Team A scores the most goal on average. $CV = \frac{SD}{\bar{x}} \times 100\% = \frac{1.37}{3.15} \times 100\%$

S.D.: 1.37 → The performance moderate consistency $= 43.55\%$

Team B:

Mean: 2.9 → Team B scores fewer goals than team A.

S.D.: 0.29 → Team B has the most consistency performance. $CV = \frac{0.29}{2.9} \times 100\% = 10\%$

Team C:

Mean: 1.23 → Team C scores the fewest goals on average.

S.D: 2.05 → Team C performance is highly inconsistent. $CV = \frac{2.05}{1.23} \times 100\% = 166.7\%$

Team A Best performance.

Team B Most Consistent.

Team C Worst performance.

Large value of CV indicates greater variability.
Smaller CV more consistent.

Consistency: Team B > C > A

b) ~~The~~ Country A:

The median corresponds on the 50th percentile

$$P_{50} = \frac{in}{100} = \frac{50 \times 900}{100}$$
$$= 450$$

∴ From the graph 2.08 kg

Country B:

$$P_{50} = \frac{50 \times 900}{100}$$
$$= 450$$

From the graph

∴ From the graph 3.85 kg

Babies in Country B have a higher Median birth weight than those in Country A.

Country A IQR from graph:

$Q_1 = 1.56$, $Q_3 = 2.48$ ∴ $IQR = 2.48 - 1.56$
$= 0.92$ kg

Country B IQR from graph:

$Q_1 = 2.17$, $Q_3 = 4.62$ ∴ $IQR = 4.62 - 2.17$
$= 2.45$ kg

Country B was a widen spread than Country A.

7.8

Name: Md. Nahian Hasan Nokib Serial No: 28

ID: 0112230581

Ans to the Ques No-7

(i) A stem-and-leaf diagram allows us to see the distribution of data while retaining the original values. This makes it easy to identify the shape of the distribution, any outliers, and the central tendency of the data.

(ii) Total number of observations in the non-exercise group:

$4+6+13+14+9+9+5+3 = 63$

$\therefore$ Median $= \frac{63+1}{2} = 32^{th} = 6.5$

Here,

$Q_1 = \frac{1+63}{4} = 16^{th} = 5.4$

$Q_3 = \frac{3(63+1)}{4} = 48^{th} = 8.3$

$\therefore IQR = Q_3 - Q_1 = 8.3 - 5.4 = 2.9$

(iii) People who exercise:

minimum $= 3.1$

maximum $= 10$

~~$Q_1 = \frac{1 \times 63}{4} = 16^{th} = 4.6$~~ ~~4.25~~

$Q_1 = 4.25$

Q_2 ~~$\frac{2 \times 63}{4}$~~

$= 5.3$ (median)

$Q_3 = 6.6$

People who do not exercise:

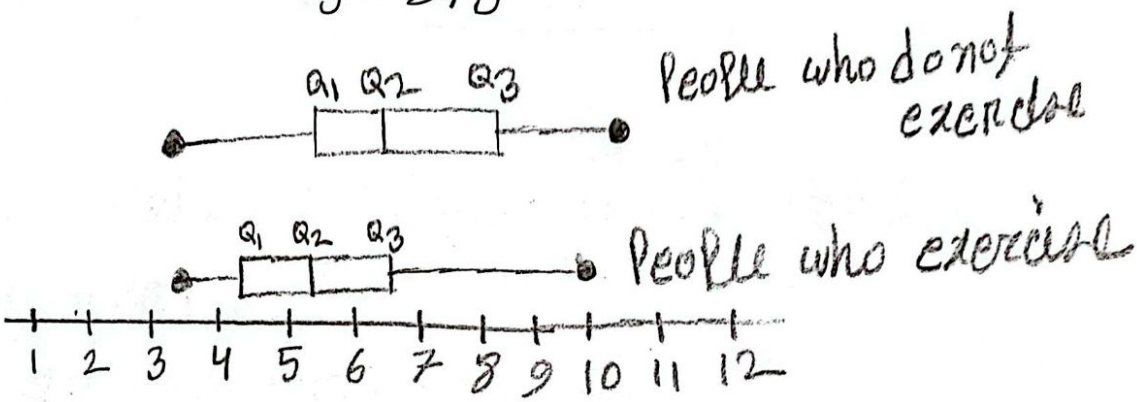
minimum $= 3.1$

Maximum $= 10.6$

$Q_1 = 5.4$

$Q_2 = 6.5$ (Median)

$Q_3 = 8.3$



(b) (i)

$a = 422 + 72 = 494$

$b = 540 - 494 = 46$

Time after opening, x minutes	midPoint (x_i)	Frequency (f_i)	$f_i x_i$
$0 < x \leq 10$	5	210	1050
$10 < x \leq 20$	15	134	2010
$20 < x \leq 30$	25	78	1950
$30 < x \leq 40$	35	72	2520
$40 < x \leq 60$	50	$b = 46$	2300
		$\sum f_i = 540$	$\sum f_i x_i = 9830$

(ii) Mean $= \frac{\sum f_i x_i}{\sum f_i} = \frac{9830}{540} = 18.2$ minutes.

Ans to the ques NO-8

Here,

minimum = 24 $\therefore$ Range = 34 − 24 = 10

maximum = 34

$Q_1 = 25$ $\therefore$ IQR $= Q_3 - Q_1$

$Q_3 = 33$ $= 33 - 25$

$= 8$

The median is closer to Q_3 than Q_1, suggesting the left whisker is longer than the right whisker.

Thus this indicates a left-skewed (negative skew) distribution.

Dotida Atca
0112320151

Ans: No-9

a)

x_i	x_i^2
16	256
12	144
9	81
11	121
7	49
19	361
15	225
12	144
10	100
20	400
13	169
$\sum x_i = 144$	$\sum x_i^2 = 2050$

Here, $n = 11$

we know,

Standard Deviation, $S.D = \sqrt{\frac{\sum x_i^2}{n} - \left(\frac{\sum x_i}{n}\right)^2}$

$= \sqrt{\frac{2050}{11} - \left(\frac{144}{11}\right)^2}$

$= 3.87$

(Ans)

b) The given set of data are:-

16, 12, 9, 11, 7, 19, 15, 12, 10, 20, 13

Ascending order:

7, 9, 10, 11, 12, 12, 13, 15, 16, 19, 20

Here, $n = 11$

Maximum Value = 20

Minimum Value = 7

$$Q_1 = \frac{i(n+1)}{4} = \frac{1 \times (11+1)}{4} = \frac{12}{4} = 3th = 10$$

$$Q_2 = \frac{i(n+1)}{4} = \frac{2(11+1)}{4} = \frac{24}{4} = 6th = 12 = \text{Median}$$

$$Q_3 = \frac{i(n+1)}{4} = \frac{3(11+1)}{4} = \frac{36}{4} = 9th = 16$$

$$IQR = Q_3 - Q_1 = (16 - 10) = 6$$

Outlier Boundaries:-

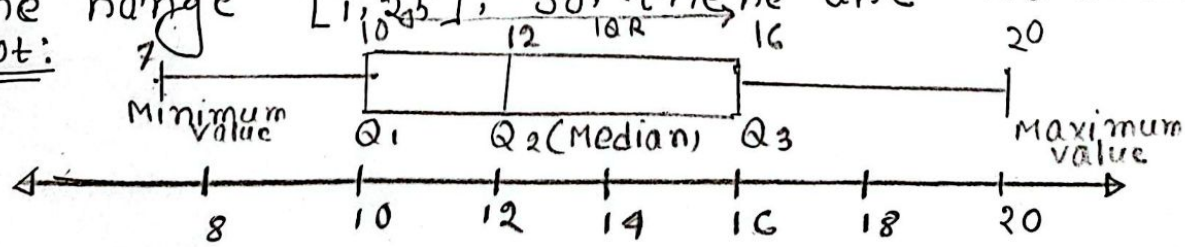
lower bound $= Q_1 - (1.5 \times IQR) = 10 - (1.5 \times 6) = 1$

upper bound $= Q_3 + (1.5 \times IQR) = 16 + (1.5 \times 6) = 25$

Any value less than 1 and greater than 25 is an outlier.

From the given data value, we can see that all the values lie within the range [1, 25], so, there are no outliers

box plot:



Ans: No-10

i) The given back-to-back stem-leaf diagram:

Company A (leaf)	Stem	Company B (leaf)
4	33	1 2 8
9 8 3 2 0	34	1 6 8 9 9
8 7 5 4 1 1	35	1 2 2 3
9 6 5 2	36	5 6
4 3 1	37	0 3 4
	38	2 8

key: 1|35|3 means the pipe diameter from Company A is 0.351 and from Company B is 0.353

For Company A, $n = 19$

$$Q_1 = \frac{i(n+1)}{4} = \frac{1\times(19+1)}{4} = 5th = 0.348$$

$$Q_3 = \frac{i(n+1)}{4} = \frac{3\times(19+1)}{4} = 15th = 0.366$$

$$\therefore IQR = Q_3 - Q_1 = (0.366 - 0.348) = 0.018$$

For Company B, $n = 19$

$$Q_1 = \frac{i(n+1)}{4} = \frac{1\times(19+1)}{4} = 5th = 0.346$$

$$Q_3 = \frac{i(n+1)}{4} = \frac{3(19+1)}{4} = 15th = 0.370$$

$$\therefore IQR = Q_3 - Q_1 = 0.370 - 0.346 = 0.024$$

(Ans)

ii) From (i)

For company A,

$n = 19$

IQR = 0.018

$\therefore Q_2 = \frac{i(n+1)}{4} = \frac{2(19+1)}{4} = 10\text{th} = 0.355 = \text{Median}$

$$\therefore \text{Mean} = \frac{0.334 + 0.340 + 0.342 + 0.343 + 0.348 + 0.349 + 0.351 + 0.351 + 0.35 + 0.355 + 0.357 + 0.358 + 0.362 + 0.365 + 0.366 + 0.369 + 0.371 + 0.37 + 0.374}{19}$$

$= 0.355$

$\therefore$ Mode =

For Company B, IQR = 0.024 [From(i)]

$n = 19$

$\therefore Q_2 = \frac{i(n+1)}{4} = \frac{2(19+1)}{4} = 10\text{th} = 0.352 = \text{Median}$

$$\therefore \text{Mean} = \frac{0.334 + 0.338 + 0.332 + 0.341 + 0.346 + 0.348 + 0.349 + 0.349 + 0.351 + 0.352 + 0.352 + 0.353 + 0.365 + 0.366 + 0.370 + 0.373 + 0.374 + 0.382 + 0.388}{19}$$

$= 0.355$

$\therefore$ Mode =

Comparison:-

	n	IQR	Median	Mean	Mode
Company A	19	0.018	0.355	0.355	0.351
Company B	19	0.024	0.352	0.355	0.352, 0.349

Back-to-Back Stem-leaf diagram:-

Company A (leaf)	Stem	Company B (leaf)
4	33	1 2 8
9 8 3 2 0	34	1 6 8 9 9
8 7 5 4 1 1	35	1 2 2 3
9 6 5 2	36	5 6
4 3 1	37	0 3 4
	38	2 8

Comparison:-

$IQR_{Company\,B} > IQR_{Company\,A}$

∴ for each set of data of Company B is more spread as compare to Company B

As, Mean is same for Company A and Company B

∴ In that case, Median is better indicator for center of distribution.

∴ $Median_{Company\,A} > Median_{Company\,B}$

∴ Less difference

∴ data for Company A is shifted towards more higher values as compare to Company B

For Company A,

Mean = Median = Mode (almost same)

∴ Symmetric distribution

For Company B, Mean is higher than Median and Mode

Positively skewed (Ans)

Serial: 11
Farhana Farhin
011223021

Ans: to the Question NO: 11

Here,

$\Sigma x^2 = 240$

$\Sigma x = 45$

$n = 15$

$\bar{x} = \frac{\Sigma x}{n} = \frac{45}{15} = 3$

$\therefore$ standard deviation, $SD = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$

$= \sqrt{\frac{240}{15} - \left(\frac{45}{15}\right)^2}$

$= \sqrt{7}$

$= 2.645$

$\therefore \Sigma(x-\bar{x})^2 = \Sigma x^2 - \frac{(\Sigma x)^2}{n}$

$= 240 - \frac{(45)^2}{15}$

$= 105.$

(Ans)

Ans: to the Question NO: 12

1. Mean Number of Goals:

The mean number of goal is the average number of goal scored by each team in the tournament.

Team A: The mean number of goals scored is 3.15. $CV = \frac{SD}{\bar{x}} \times 100\% = \frac{1.37}{3.15} \times 100\%$

43.5%.

Team B: The mean number of goals scored is 2.9. $CV = \frac{0.29}{2.9} \times 100\% = 10\%$

Team B is better.

Interpretation: Team A scored more goals on average than team B.

2. Standard Deviation: The standard deviation measures the variability or dispersion of the goals scored by each team

Team A : The standard deviation is 1.37.

Team B : The standard deviation is 0.29.

Interpretation :

The higher standard deviation for team A(1.37) compared to team B(0.29) indicates that the ~~m~~ number of goals scored by team A varied more widely from game to game. In Constrast, Team B's performance was more consistent, with less variability in the number of goals scored per game.

Conclusion :

Higher Mean : Team A was more offensively successful on average.

Lower variability : Team B had more consistent performance across the game.

Serial 10

Sampriti Joya

011223018

Answer to the question no: 13

(a) median. $Q_2 = \frac{2(27+1)}{4}$

$= 14^{th}$ value

$= \$2710$

$Q_1 = \frac{1(27+1)}{4} = 7^{th}$ value $= \$2610$

$Q_3 = \frac{3(27+1)}{4} = 21^{th}$ value $= \$2840$

$\therefore IQR = Q_3 - Q_1 = \$(2840 - 2610)$

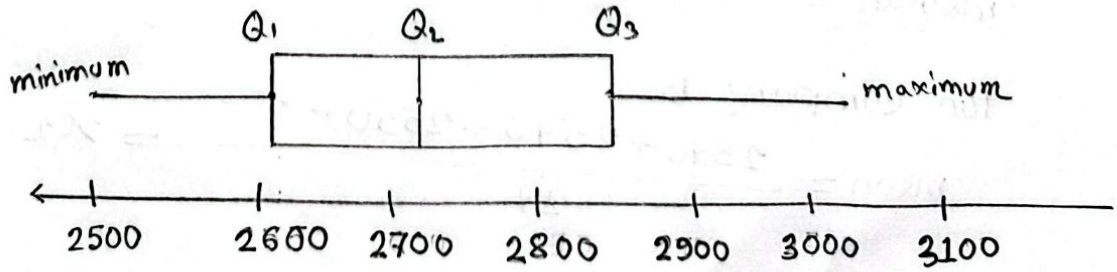
$= \$230$

(b) for the company A,

the small value $= \$2500$

the large value $= \$3010$

$Q_1 = \$2610$ $Q_2 = \$2710$ $Q_3 = \$2840$



Box and whisker diagram for company A

for company B

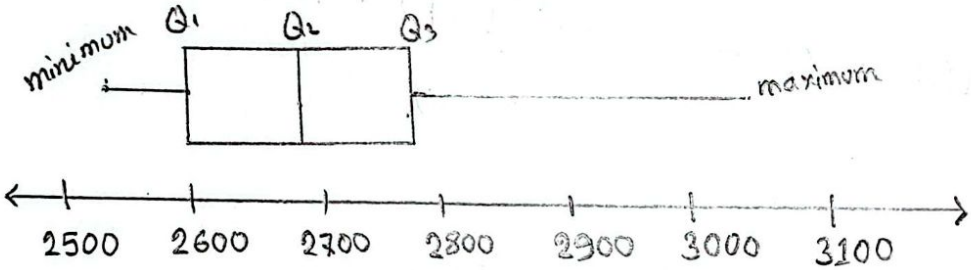
the small value = \$2540

the large value = \$3090

lower quartile, Q_1 = \$2600

median. Q_2 = \$2690

upper quartile. Q_3 = \$2780



Box and whisker diagram for Company B

(c) for company A,

$$\text{mean} = \frac{2550 + 2500 \cdots\cdots}{27} = x_1$$

median = \$2710

for company B

$$\text{mean} = \frac{2540 + 2540 + 2550 + \cdots\cdots}{27} = x_2$$

median = \$2690

When we calculate mean we need more complex calculation. Sometimes we mistake this when we calculate this mean.

But when we calculate median, we easily done this to use quartile equation.

(d) Minimum Salary for company A as an outlier.

$Q_1 - 1.5 \times IQR$ [Values from a]

$= 2610 - 1.5 \times 230$

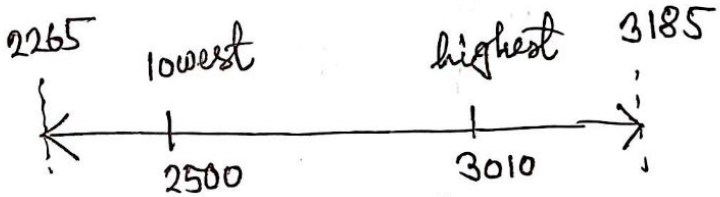
$= \$2265$

Maximum salary for company B as an outlier

$Q_3 + 1.5 \times IQR$

$= 2890 + 1.5 \times 230$

$= \$3185$



no - outlier for Co. A,

Minimum salary ~~for~~ and maximum salary for company B as an outlier

$Q_1 - 1.5 \times IQR$

$= 2600 - 1.5 \times 180$

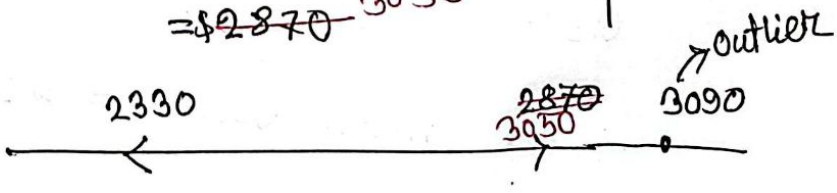
$= \$2330$

$Q_3 + 1.5 \times IQR$

$= \cancel{2600}\ 2780 + 1.5 \times 180$

$= \cancel{\$2870}\ 3050$

IQR = (2780 - 2600) = 180



Answer to the question no: 14

(a)

Class	f	c.f
0 - 10	210	210
10 - 20	134	344
20 - 30	78	422
30 - 40	72	a = 494
40 - 60	b = 46	540

$\therefore a = 494$

$b = 46$

(b) its a symmetrical distribution, so the mean. median and mode are in same place.

$Q_1 = 39$

$Q_3 = 63$

$Q_2 = \frac{39 + 63}{2} = 51$ = median

$\therefore$ the mean value = 51.

(e) $n = 24$

$\Sigma x = 64$

$\Sigma x^2 = 352$

mean, $\bar{x} = \frac{\Sigma x}{n} = \frac{64}{24}$

$= 2.667$

Standard deviation, $SD = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$

$= \sqrt{\frac{352}{24} - \left(\frac{64}{24}\right)^2}$

$= 2.749$

(Ans.)

42 Sayeem Mahmood (0112320123) 15,16

Theme: Date: / /

Sat Sun Mon Tue wed Thu Fri

15(a)(i) From the graph, we can see that max^m time taken to complete the puzzle is 50 seconds.

Now, we can find the number of children by looking in the cumulative frequency. At 50 seconds the cumulative frequency is 120. So, total 120 children participated.

(ii) Here,

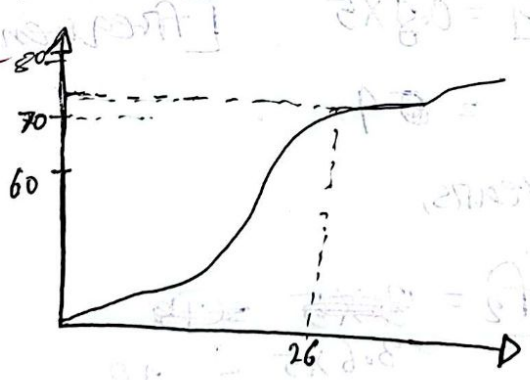
40% of 120 = 0.4 × 120 = 48

and 60% of 120 = 0.6 × 120 = 72 (we need this)

$\left(\frac{60}{100} \times 120\right)^{th}$

$= 72^{th}$

$= 28$



So, approximately 28 seconds is the value of T.

BD SCHOOL SHOP
ONE-STOP SCHOOL SHOPPING

b) i) 30-35.

ii) we know,

Frequency = frequency density × class size

for class. 25 to 30,

frequency density = ~~5~~ 4.8 fathers per year.

class size = 5.

so, frequency = ~~40~~ 4.8 × 5 = 24 fathers.

iii) for ~~0~~ 15-20 years.

$f_1 = 0.8 \times 5$ [frequency density = 0.8
Class size = 5]

$= 4$

for ~~20~~ - ~~25~~ years,

$f_2 = \cancel{3 \times 5}$ ~~15~~
$3.6 \times 5 = 18$

for 25-30 years,

$f_3 = 24$ [from ii]

BD SCHOOL SHOP
ONE-STOP SCHOOL SHOPPING

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Sat Sun Mon Tue wed Thu Fri

for 35 - 40 years,

$$f_4 = 5.2 \times 5 = 18.72 \approx 19$$

for 40 - 45, 45 - 50, 50 - 55, 55 - 60, 60 - 65 (together)

$$f_5 = (0.4 \times 5).5 = 10$$

So,

- total fathers in the sample is $= f_1 + f_2 + f_3 + f_4 + f_5$

$$= 4 + 18 + 24 + 19 + 10$$

$$= 75.$$

Theme:

Date: / /

Sat Sun Mon Tue wed Thu

16) i)

$$\bar{x} = \frac{\Sigma x}{n} = 8.6$$

$$\bar{y} = \frac{\Sigma y}{n} = 12.6$$

table:-

x	y	$x-\bar{x}$	$y-\bar{y}$	$(x-\bar{x})(y-\bar{y})$	$(x-\bar{x})^2$	$(y-\bar{y})^2$
2	4	-6.6	-8.6	56.76	43.56	73.96
3	5	-5.6	-7.6	42.56	31.36	57.76
5	7	-3.6	-5.6	20.16	12.96	31.36
7	10	-1.6	-2.6	4.16	2.56	6.76
8	12	-0.6	-0.6	0.36	0.36	0.36
9	14	0.4	1.4	0.56	0.16	1.96
10	15	1.4	2.4	3.36	1.96	5.76
12	18	3.4	5.4	18.36	11.56	29.16
14	19	5.4	6.4	34.56	29.16	40.96
16	22	7.4	9.4	69.56	54.76	88.36
				$\Sigma = 250$	$\Sigma = 188.4$	$\Sigma = 336.4$

So,

$$r = \frac{\Sigma(x-\bar{x})(y-\bar{y})}{\sqrt{\Sigma(x-\bar{x})^2 \cdot \Sigma(y-\bar{y})^2}} = \frac{250}{\sqrt{188.4 \times 336.4}}$$

$$= 0.995$$

strong $0.7 \leq r < 1$ ∴ Strong positive co-relation.

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x	y	x^2	xy
2	4	4	8
3	5	9	15
5	7	25	35
7	10	49	70
8	12	64	96
9	14	81	126
10	15	100	150
12	18	144	216
14	19	196	266
16	22	256	352

$\Sigma x = 86$ $\Sigma y = 126$ $\Sigma x^2 = 928$ $\Sigma xy = 1339$

$n = 10.$

So,

$$a = \frac{\Sigma y \Sigma x^2 - \Sigma x \Sigma xy}{n \Sigma x^2 - (\Sigma x)^2} = \frac{(126 \times 928) - (86 \times 1339)}{(10 \times 928) - (86)^2} = 1.17$$

$$b = \frac{n \Sigma xy - \Sigma x \Sigma y}{n \Sigma x^2 - (\Sigma x)^2} = \frac{(10 \times 1339) - (86 \times 126)}{(10 \times 928) - (86)^2} = 1.33$$

So,

$$y = 1.17 + 1.33x.$$

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iii) For $x = 11$,

$y = 1.17 + 1.33(11) = 15.80.$

~~Stat~~ sales in, $15.80 \times 1000 = 15800$

iv) Slope ($b = 1.33$): For every \$1000 spent, ~~on~~ sales are expected to increase 1330 units

intercept ($a = 1.17$): When no money is spent, ~~on~~ the ~~ext~~ estimated sales would be 1170 units.

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