



Q3.] {1, 3, 5, 7, 9, 11, 13, 15, 17, 19}

$$\therefore Q_2 = \text{Median} = \frac{9+11}{2} = \frac{20}{2} = 10$$

$$Q_1 = 5, \quad Q_3 = 15$$

$$\therefore \text{Inter Quatile Range} = Q_3 - Q_1 = 15 - 5 = 10$$

$$\therefore \text{minimum} = 1, \text{ maximum} = 19$$

Outlier

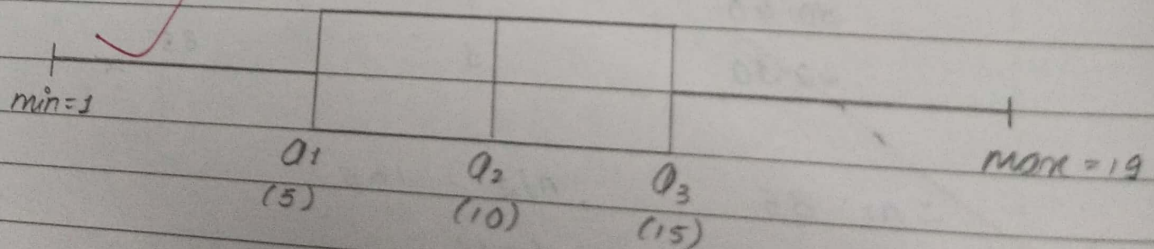
$$\begin{aligned} 1.) \text{ Higher Outlier} &= Q_3 + 1.5 (IQR) \\ &= 15 + 1.5 \times 10 \\ &= 30 \end{aligned}$$

$$\begin{aligned} 2.) \text{ Lower Outlier} &= Q_1 - 1.5 (IQR) \\ &= 5 - 1.5 \times 10 \\ &= -10 \end{aligned}$$

No values are below -10 & above 30 so there are no outliers

$$\therefore Q_1 = 5, \quad Q_2 = 10, \quad Q_3 = 15$$

$$\text{min} = 1, \quad \text{max} = 19$$



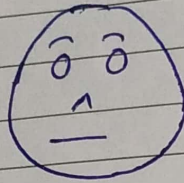




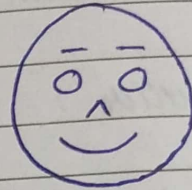
Q6) 1.) Chernoff faces for 1st two tuples

Age  $\Rightarrow$  (young) (small circle)  
Income  $\Rightarrow$  high (large eyes)  
Student  $\Rightarrow$  No (grim eyebrows)  
Credit  $\Rightarrow$  fair (neutral mouth)  
Boys-computer  $\Rightarrow$  No (small nose)

ID 1:



ID 2:



2.) Stick figures for 2nd remaining tuples

Age  $\Rightarrow$  middle-Age - (small body)  
old - (large body)

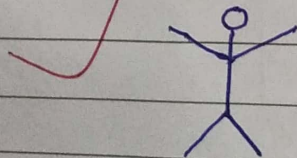
Income  $\Rightarrow$  High - (long legs)  
medium - (short legs)

Student  $\Rightarrow$  No (small face)

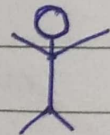
Credit-rating  $\Rightarrow$  fair (Neutral stance)

Boys-computer  $\Rightarrow$  yes (arms raised)

ID 1:



ID 2:







Q8) {4, 8, 15, 21, 21, 24, 25, 28, 34}

Bin	means	bin mean	bin median	bin bounds
b <sub>1</sub>	{4, 8, 15}	⇒ {9, 9, 9}	⇒ {8, 8, 8}	⇒ {4, 4, 15}
b <sub>2</sub>	{21, 21, 24}	⇒ {22, 22, 22}	⇒ {21, 21, 21}	⇒ {21, 21, 24}
b <sub>3</sub>	{25, 28, 34}	⇒ {29, 29, 29}	⇒ {28, 28, 28}	⇒ {25, 25, 34}

Q9) {5, 10, 11, 13, 15, 35, 50, 55, 92, 72, 204, 215}

bin	bin min
b <sub>1</sub>	{5, 10, 11, 13} ⇒ {9.75, 9.75, 9.75, 9.75}
b <sub>2</sub>	{15, 35, 50, 55} ⇒ {38.75, 38.75, 38.75, 38.75}
b <sub>3</sub>	{72, 92, 204, 215} ⇒ {145.75, 145.75, 145.75, 145.75}

bin median





observed	expected	$(O-E)^2$	$(O-E)^2/E$
250	80	25600	284.44
200	360	25600	71.11
50	210	25600	121.90
1000	840	25600	30.47

$$\chi^2_{cal} = \sum (O-E)^2/E = 507.92$$

$$\chi^2_{table} = 6.635 \text{ at } 1\% \text{ LOS with 1 d.o.f}$$

$$\chi^2_{cal} > \chi^2_{table}$$

$\therefore$  Null hypothesis Rejected

$\therefore$  strong correlation