ex. (2) MU - DEC 2019 (10) M.

Suppose, that the data analyst for analysis includes the attribute salary. We have the following values for the salary (in thousand dollars) shown in increasing order.

30, 36, 47, 50, 52, 52, 56, 60, 63, 70, 70, 110.

i) What are the mean, median, mode and midrange of the data.

ii) Find the first quartile (Q1) and third quartile (Q3) of the data.

iii) Show the box plot of the data.

Solution :- Given dataset is,

30, 36, 47, 50, 52, 52, 56, 60, 63, 70, 70, 110.

a) First calculate the Mean

$$\text{Mean} = \bar{X} = \sum_{i=1}^{n} \frac{x_i}{n} = \frac{696}{12} = 58.$$

Now, Median $= \frac{52+56}{2} = \underline{54}$.

(as the dataset contain even no)

Now Mid range $= \frac{30+110}{2} = \frac{140}{2} = \underline{70}$

Now, Quartile $Q_1 = \frac{25}{100} \times (n+1)$

$= \frac{25}{100} \times 13.$

$= 3.25^{th}$ term/index.

$Q_1 = 3^{rd}$ term $+ 0.25\,(4^{th}$ term $- 3^{rd}$ term$)$

$= 47 + 0.25(50 - 47)$

$= 47 + 0.25(3).$

$Q_1 = 47.75$

$Q_2 = \text{Median} = 54.$

$$Q_3 = \frac{75}{100} \times (n+1)$$

$$= \frac{75}{100} \times 13.$$

$$= 9.75^{th} \text{ term.}$$

$$Q_3 = 9^{th} \text{ term} + 0.75\,(10^{th} \text{ term} - 9^{th} \text{ term})$$

$$= 63 + 0.75\,(70 - 63)$$

$$= 63 + 0.75\,(7)$$

$$= 63 + 5.25.$$

$Q_3 = 68.25.$

Inter quartile range $= IQR = Q_3 - Q_1 = 68.25 - 47.75.$

$IQR = 20.5$

Now the lower limit $= Q_1 - 1.5 * IQR.$

$= 47.75 - 1.5 * 20.5$

$= 47.75 - 30.75$

$= 17.$

and Upper limit $= Q_3 + 1.5 * IQR.$

$= 68.25 + 1.5 * 20.5$

$= 68.25 + 30.75$

$= 99$

So the maximum and minimum lies bet^n $[17, 99]$.

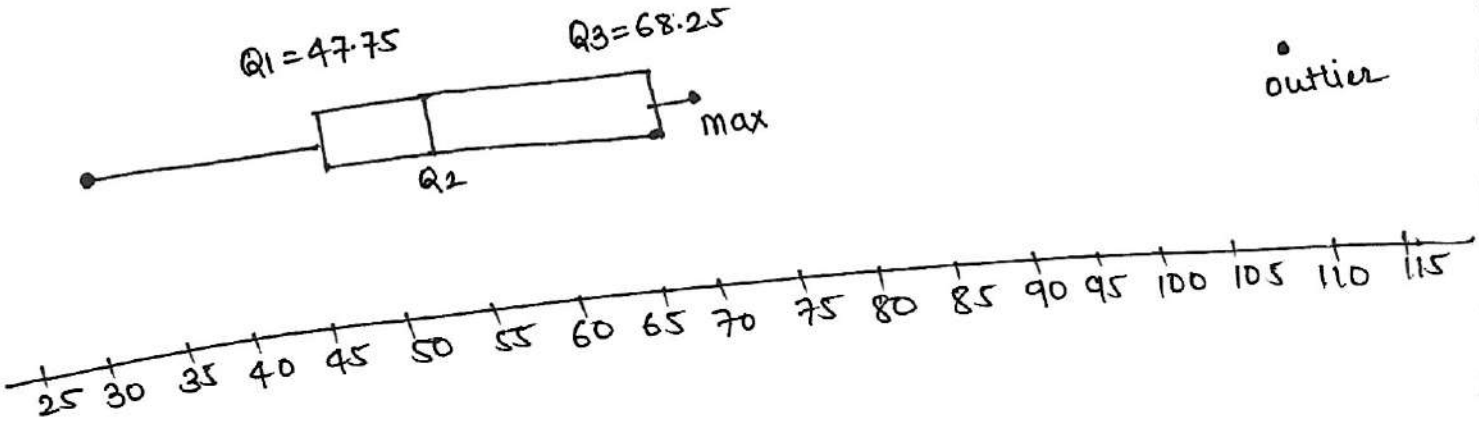
Hence the minimum will be $= 30$

and maximum will be $= 70$

Hence the five number summary will be,

30, 47.75, 54, 68.25, 70.

The box plot will be,



ex. (3) Dataset 1, 2, 5, 6, 7, 9, 12, 15, 18, 19, 27.

Find i) Mean
ii) Mode
iii) Median
iv) Q1 and Q3.
v) Five number summary.
vi) draw the box plot.

Solution :- Given dataset, (arrange it in ascending order)

1, 2, 5, 6, 7, 9, 12, 15, 18, 19, 27

Mean $= \frac{121}{11} = 11$

Mode = No mode.

iii) Median = 9

{As it contain odd items}.

Quartile $Q_1 = \frac{25}{100} \times (n+1)$

$= \frac{25}{100} \times 12$.

$= 3^{rd}$ index.

$\boxed{Q_1 = 5}$

Quartile $Q_3 = \frac{75}{100} \times (n+1)$

$= \frac{75}{100} \times 12$.

$= 9^{th}$ index/term.

$\boxed{Q_3 = 18}$

Interquartile Range $= Q_3 - Q_1$

$= 18 - 5$

$= 13$.

lower limit $= Q_1 - 1.5 * IQR$.

$= 5 - 1.5 * 13$.

$= 5 - 19.5$.

$= -14.5$

upper limit $= Q_3 + 1.5 * IQR$.

$= 18 + 1.5 * 13$.

$= 18 + 19.5$

$= 37.5$.

Hence the maximum and minimum will lies between $[-14.5, 37.5]$.

Hence minimum $= 1$.

maximum $= 27$.

Five number summary will be,

1, 5, 9, 18, 27.

The box plot will be.