8.2

(a) $\text{Mean} = \frac{\sum x_i}{n}$

$$= \frac{17.2 + 22.1 + \ldots\ldots 11.9}{50}$$

$$= \frac{897.7}{50} \Rightarrow 17.954$$

$$\text{Variance} = \frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2$$

$$= \frac{(17.2 - 17.954)^2 + (22.1 - 17.954)^2 + \ldots\ldots (11.9 - 17.954)}{50 - 1}$$

$$= \frac{488.445}{49} \Rightarrow \boxed{9.968}$$

$$\text{Standard deviation} = \sqrt{\text{variance}}$$

$$= \sqrt{9.968} = \boxed{3.157}$$

(b) $\text{Standard Error} = \frac{\text{Variance}}{\sqrt{n}}$

$$= \frac{3.157}{\sqrt{50}} = \boxed{0.447}$$

(c) MINITAB is used to construct the five point summary and a boxplot.

There are 5 steps:-

step 1 : Enter the data into MINITAB sheet.

step 2 : click Basic statistics → Descriptive statistic

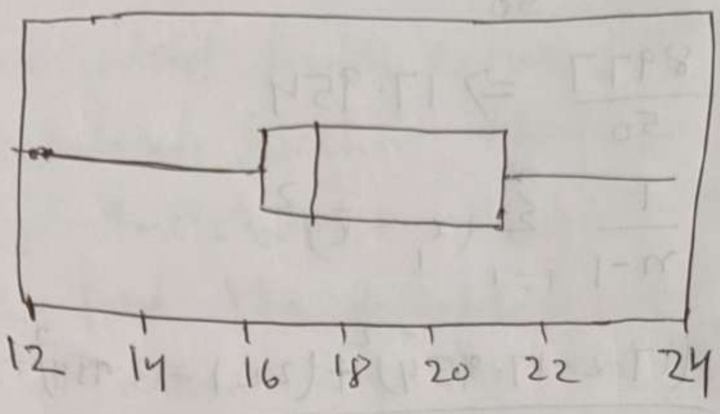
step 3 : Enter the data in Variables box.

step 4 : click graphs → select Boxplot

step 5 : click ok

The descriptive statistics data output is below.

Variance	Mean	S.D	Minimum	Q1	Median	Q3	Max
C2	17.954	3.157	11900	15.8	17.588	19.9	24.1



(d) Interquartile Range (IQR)

$IQR = Q_3 - Q_1$

$= 19.9 - 15.8 = \boxed{4.1}$

lowerfence $= Q_1 - 1.5(IQR)$

$= 15.8 - 6.15 = 9.65$

uppafence $= Q_3 + 1.5(IQR)$

$= 19.9 + 6.15 = 26.50$

Hence, no outliers present in the given data.

e) We will consider the intervals

as 10 to 10.99, 11 to 11.99 .... 24 to 24.99.

The histogram shown in the figure below and it doesn't look like bell curve.

Hence the answer is $\boxed{NO}$

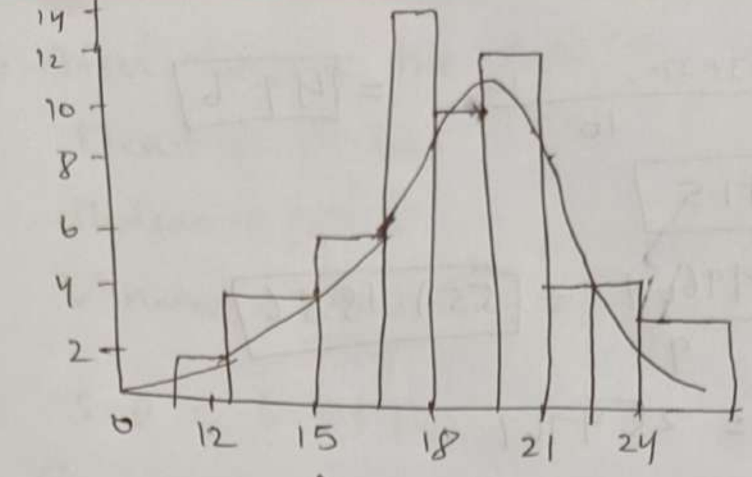


fig: Histogram

8.4 $Q_1 = 0.25$

z Value for $p(Q_1) = -0.6745$

$Q_3 = 0.75$

$= \text{Value for } p(Q_3) = 0.6745$

$IQR = 0.645 + 0.645$

$= 1.349$

probability that normal random Variable is within 1.5 IQR of Quartile,

$= p(Q_1 - 1.5 \times IQR < Q_3 + 1.5 \times IQR)$

$= p(-0.675 - 1.5 \times 1.35 \leq z \leq 0.675 + 1.5 \times 1.35)$

$= p(-2.698 < z < 2.698)$

$= \boxed{0.993}$

We know that rule of 1.5 IQR actually comes from the intution that data are nearly normally distributed.

So 99.7% of the population should appear within 1.5(IQR) from Quartiles.

8.9 (a) Mean $= \frac{43+37+\ldots 10}{10} = \boxed{49.6}$

Median $= \boxed{47.5}$

$S =$ variance $= \frac{4960.4}{9} = \boxed{551.1556}$

$S.D = \sqrt{s^2} = 23.4767$

std Error $= \boxed{7.423925}$

$Q_1 \Rightarrow 0.25 \times 10 \Rightarrow 2.5 \cong 3$ is $\boxed{43}$

$Q_2 =$ Median $= \boxed{47.5}$

$Q_3 = 0.75 \times 10 = 7.5 \cong 8$ is $\boxed{52}$

$Q_4 = 100\% \Rightarrow 1 \times 10 \Rightarrow 10 \Rightarrow \boxed{10.5}$

(b) Outliers $IQR = 52 - 43 = 9$.

Max outliers $< Q_1 - 1.5(IQR)$

$< 43 - 13.5$

< 29.5

x_i that comes under the range is 10.

Maximum outliers $> Q_3 + 1.5(IQR)$

$> 52 + 1.5(9)$

> 65.5

x_i that comes under this range is 105.

(c) After deleting the detected outliers

Mean $\Rightarrow 47.625$

Median $\Rightarrow 47.5$

Variance $= \frac{291.875}{7} = 41.69$

S.D $= 6.4572$

$Q_1 = 0.25 \times 8 = 2 \Rightarrow 44.$

$Q_2 =$ Median $= 47.5$

$Q_3 = 0.75 \times 8 = 6 \Rightarrow 51.5$

$Q_4 = 1 \times 8 \Rightarrow 58.$

(d) After removing outliers,

Mean, s.d and Quartile values are decreased

But the median remained same.

The figure without outliers box is shrinked. i,e we get sharp values.