

## Assignment -1

### Solution

①

②

Here  $n = 20$

number of class intervals,  $K = 1 + 3.22 \log_{10}(n)$   
 $= 5.3 \approx 6$

Frequency distribution table:

class	Frequency	Relative freq
2.5 - 2.9	1	$\frac{1}{20} = 0.05$
3.0 - 3.4	8	0.4
3.5 - 3.9	7	0.35
4.0 - 4.4	2	0.1
4.5 - 4.9	2	0.1
' Total	20	1.0

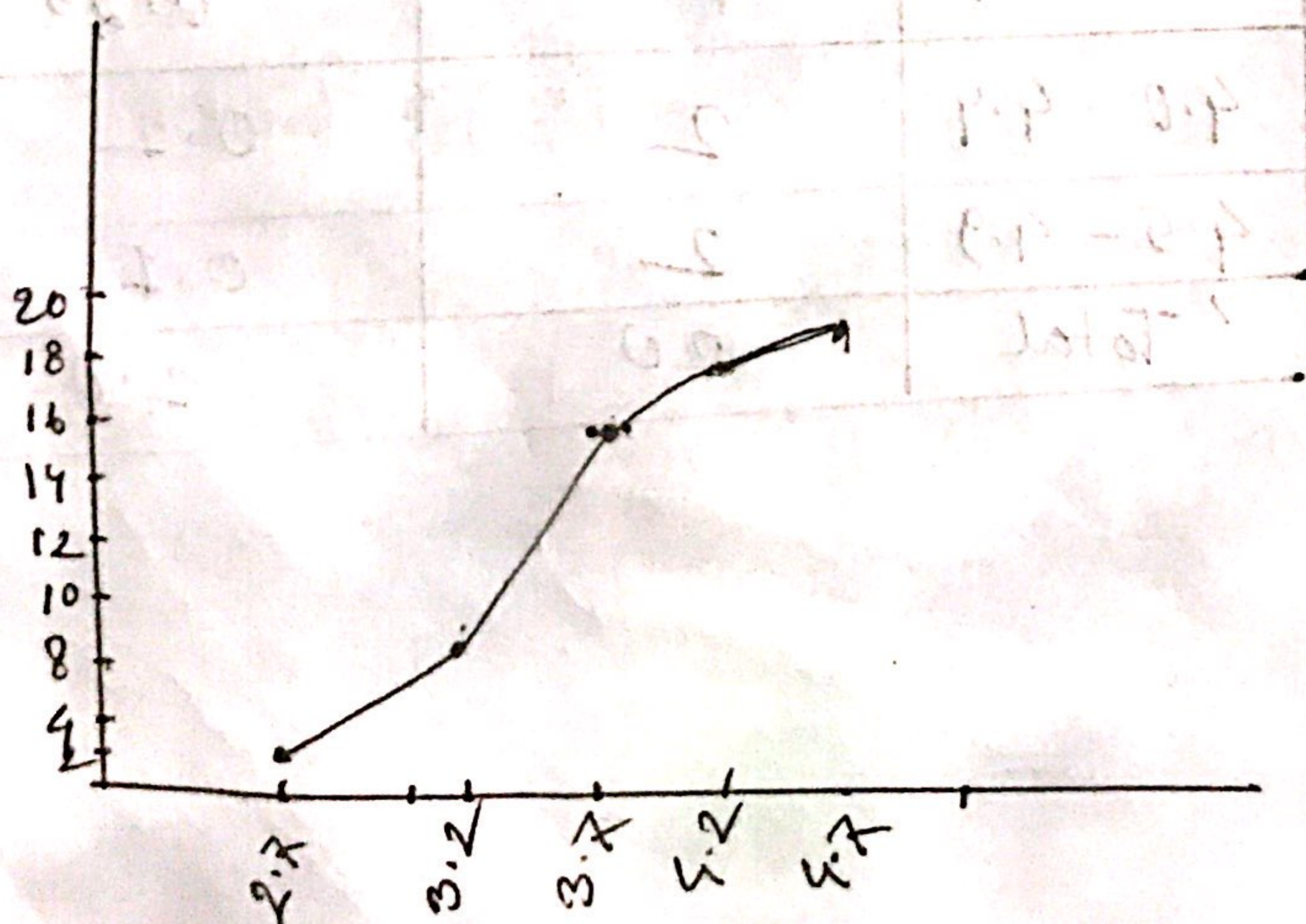


6

## Cumulative frequency table:

Life	Cumulative freq.	Class mid.
Life less than 2.95	1	2.7
less than 3.45	9	3.2
less than 3.95	16	3.7
less than 4.45	18	4.2
less than 4.95	20	4.7

## Cumulative frequency (ogive):





less than 4 years  $\approx 18 = \frac{18}{20} \times 100\% = 90\%$

Between 3.25 - 3.75  $\approx 8 = \frac{8}{20} \times 100 = 40\%$

Ans to the q. no. 2

☐ In a data set, the values have a tendency to cluster around a certain point. This tendency of clustering the value around the center of series is usually called central tendency.

☐ The common measures of central tendency are -

→ Arithmetic mean

→ Median

→ Mode.



□ Arithmetic mean

$$\bar{x} = \frac{\sum fx}{n}$$

here,

$\bar{x}$  = Arithmetic mean

$\sum fx$  = sum of frequency and mid values product.

$f$  = frequency

$x$  = mid value.

$n$  = number of sample.



Ans to the q: no- 3

Q

Sorted List : 10, 37, 43, 45, 45, 50, 51, 52, 58, 105.

here,

numbers of days,  $n = 10$

Sum,  $\sum x = 496$

so, mean,  $\bar{x} = \frac{\sum x}{n} = \frac{496}{10} = 49.6$

Quantiles:

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

$Q_1 = P_{25} = 25 \times 10 = 250$  is not divisible by 100

$$Q_1 = \frac{n \times n}{100} \approx \frac{250}{100} = 2.5 \approx 3^{\text{th}} \text{ value} = 43$$

$Q_2 = P_{50} = 50 \times 10 = 500$  divisible by 100

$$Q_2 = \frac{\left(\frac{500}{100}\right)^{\text{th}} + \left(\frac{500}{100} + 1\right)^{\text{th}}}{2} \text{ value} = \frac{5^{\text{th}} + 6^{\text{th}}}{2}$$

(P40)



## Standard Deviation

$$= \frac{45 + 50}{2} = 47.5$$

$$Q_3 = \frac{750}{100} \approx 8^{\text{th}} \text{ value} = 52$$

## Standard Deviation

$$S^2 = \frac{\sum (x - \bar{x})^2}{n-1}$$

$$= \frac{4960.4}{9} = 551.156$$

$$S = 23.5$$



Q

$$IQR = (Q_2 - Q_1)$$

$$= (52 - 43) = 9$$

Outliers is,  $Q_1 - 1.5 \times IQR$  less than

$$= 43 - 1.5 \times 9$$

$$= 29.5$$

And

greater than,

$$Q_3 + 1.5 \times IQR$$

$$= 52 + 1.5 \times 9 = 65.5$$



Ans to the q. no. 4

- Q1 Moments: Moments are statistical measures that describe the shape, center, and spread of a probability distribution.
- Q2 Skewness: Skewness is a measure of the asymmetry of a probability distribution.
- Q3 Kurtosis: The degree of peakedness of a distribution, usually taken in relation to a normal distribution is called Kurtosis.
- Q4 The third moment is called skewness, and the fourth moment is known as Kurtosis.



Ans to the q. no- 5

Given that

$$\mu_1' = 1$$

$$\mu_2' = 16$$

$$\text{and } a = 5$$

$$\mu_3' = -40$$

we know that

$$\mu_1' = \bar{x} - a$$

$$\Rightarrow 1 = \bar{x} - 5$$

$$\therefore \bar{x} = 6$$

$$\text{So, mean, } \bar{x} = 6$$

Again,

$$\mu_2 = \mu_2' - \mu_1''$$

$$\Rightarrow \sigma^2 = 16'' - 1'' = 15$$

$$\text{So, variance, } \sigma^2 = 15$$



$$\mu_g = \mu_g' - 2\mu_2'\mu_1' + 2\mu_4^3$$

$$= -40 - 2(16) + 2 \times 1^3$$

$$= -86$$

So: the <sup>third</sup> central moment is  $-86$ .