# Numeric Response Questions
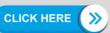
# Measure of Central Tendency

Q.1 Find median from the following distribution:

| Class | Frequency |
|---|---|
| $5 - 10$ | 5 |
| $10 - 15$ | 6 |
| $15 - 20$ | 15 |
| $20 - 25$ | 10 |
| $25 - 30$ | 5 |
| $30 - 35$ | 4 |
| $35 - 40$ | 2 |
| $40 - 45$ | 2 |

Q.2 A set of 7 observations has mean 10 and another set of 3 observations has mean 5, Then find the mean of combined set.

Q.3 The standard deviations of 25 numbers is 40. If each of the numbers is increased by 5, then find the new standard deviation.

Q.4 If mean = 22 & median = 23 then find value of mode.

Q.5 Find the mean deviation about median for the following data 340, 150, 210, 240, 300, 310, 320.

Q.6 Mean of 100 items is 49. It was discovered that three items which should have been 60,70,80 were wrongly read as 40,20,50 respectively. Then find the correct mean.

Q.7 The mean of 5 numbers is 18. If one number is excluded, their mean becomes 16. Then find the excluded number.

Q.8 The mean and S.D. of the marks of 200 candidates were found to be 40 and 15 respectively, Later, it was discovered that a score of 40 was wrongly read as 50  Then find correct standard deviation.

Q.9 If the mean of a set of observations $x_1, x_2, \ldots, x_{10}$ is 20, then find the mean of $x_1 + 4, x_2 + 8, \ldots, x_{10} + 40$.

Q.10 The mean weight of 9 items is 15 , If one more item is added to the series, the mean becomes 16. Then find value of $10^{ht}$ item.

Q.11 Find the mode of the following distribution:

| Class Interval | $0 - 10$ | $10 - 20$ | $20 - 30$ | $30 - 40$ | $40 - 50$ | $50 - 60$ | $60 - 70$ |
|---|---|---|---|---|---|---|---|
| $f$ | 5 | 8 | 7 | 12 | 28 | 20 | 10 |

Q.12 The algebraic sum of the deviation of 20 observation measured from 30 is 2. Then find the mean of observation.

Q.13 The standard deviation of the wages of 85 employees is Rs. 15.40. After one year each of them is given an increment of Rs. 25. Then find the standard deviation of new wages (in Rs.).

Q.14 Find the variance of the data 2,4,6,8,10,

Q.15 Suppose a population A has 100 observations 101, 102, ... 200 and another population B has 100 observations $151, 152, \ldots \ldots, 250$. If $V_A$ and $V_B$ represent the variances of the two populations respectively, then find $\frac{V_A}{V_B}$.

**1.** 19.50  **2.** 8.50  **3.** 40.00  **4.** 25.00  **5.** 52.80  **6.** 50.00  **7.** 26.00
**8.** 14.98  **9.** 42.00  **10.** 25.00  **11.** 46.67  **12.** 30.10  **13.** 15.40  **14.** 8.00
**15.** 1.00

# Hints & Solutions

**1.**

| Class | $f_i$ | C.F. |
|-------|-------|------|
| 5 – 10 | 5 | 5 |
| 10 – 15 | 6 | 11 |
| 15 – 20 | 15 | 26 |
| 20 – 25 | 10 | 36 |
| 25 – 30 | 5 | 41 |
| 30 – 35 | 4 | 45 |
| 35 – 40 | 2 | 47 |
| 40 – 45 | 2 | 49 |

$$\frac{N}{2} = \frac{49}{2} = 24.5$$

Median class is (15 – 20)

As, Median $= 15 + \dfrac{24.5 - 11}{15} \times 5$

$$= 15 + \frac{13.5}{3} = 15 + 4.5 = 19.5$$

**2.**  $n_1 = 7, \ \bar{x}_1 = 10$

$n_2 = 3, \ \bar{x}_2 = 5$

$$\bar{x} = \frac{n_1 \bar{x}_1 + n_2 \bar{x}_2}{n_1 + n_2}$$

$$\bar{x} = \frac{7 \times 10 + 3 \times 5}{7 + 3} \implies \bar{x} = 8.5$$

**3.**  Remains same (by property of standard deviation)

**4.**  Mode $= 3(\text{median}) - 2\,(\text{mean}) \implies 3 \times 23 - 44$
Mode $= 25$

**5.**  Median $= 300$

$$\text{M.D.} = \frac{150 + 90 + 60 + 0 + 10 + 20 + 40}{7}$$

$$= \frac{370}{7} = 52.8$$

**6.**  $\bar{x} = \dfrac{49 \times 100 - 40 - 20 - 50 + 60 + 70 + 80}{100}$

$$= \frac{4900 + 100}{100} = 50$$

**7.**  $(16 \times 4) = (5 \times 18) - x$
$x = 90 - 64 = 26$

**8.**  Correct mean $= \dfrac{(200 \times 40) - 50 + 40}{200}$

$$= \frac{7990}{200} = 39.95$$

**9.**  $\bar{x} = \dfrac{x_1 + x_2 + x_3 + \ldots + x_{10}}{10}$

$\bar{x} = \dfrac{x_1 + 4 + x_2 + 8 + x_3 + 12 + \ldots + x_{10} + 40}{10}$

$= \dfrac{(x_1 + x_2 + x_3 + \ldots + x_{10})}{10} + \dfrac{4(1 + 2 + 3 + \ldots + 10)}{10}$

$= 20 + 4 \times \dfrac{10 \times 11}{10 \times 2} = 42$

**10.**  $\dfrac{\Sigma x_i}{9} = 15 \qquad \Rightarrow \Sigma x_i = 135$

$\dfrac{\Sigma x_i'}{10} = 16 \qquad \Rightarrow \Sigma x_i' = 160$

$10^{\text{th}}$ date $= \Sigma x_i' - \Sigma x_i$
$\qquad = 160 - 135 = 25$

**11.**  mode $= \ell + \left( \dfrac{f_m - f_{m-1}}{2 f_m - f_{m-1} - f_{m+1}} \right) \times h$

$$= 40 + \left( \frac{28 - 12}{2 \times 28 - 12 - 20} \right) \times 10$$

$$= 46.67$$

**12.** $\displaystyle\sum_{i=1}^{20}(x_i - 30) = 2$

$(x_1 + x_2 + \ldots\ldots + x_{20}) = 602$

$\overline{x} = \dfrac{x_1 + x_2 + \ldots + x_{20}}{20} = \dfrac{602}{20} = 30.1$

**13.** Variance or standard deviation will remain same

**14.** Here $\overline{x} = \dfrac{2+4+6+8+10}{5} = 6$

Here, variance $= \dfrac{1}{n}\Sigma[x_i - \overline{x}]^2$

$= \dfrac{1}{5}\{(2-6)^2 + (4-6)^2 + (6-6) + (8-6)^2 +$

$(10-6)\}$

$= \dfrac{1}{5}\{(16 + 4 + 0 + 4 + 16)\} = \dfrac{1}{5}\{40\} = 8$

**15.** Let $x_1, x_2 \ldots\ldots$ be n values of x.

then $\sigma = \dfrac{1}{n}\displaystyle\sum_{i=1}^{n}(x_i - \overline{x})^2$

the variable ax + b takes values
$ax_1 + b, ax_2 + b, \ldots\ldots, ax_n + b$ with mean
$\overline{x} + b$

$\therefore$ SD of (ax + b)

$= \sqrt{\dfrac{1}{n}\displaystyle\sum_{i=1}^{n}\{(ax_i - b) - (a\overline{x} - b)\}^2}$

$= \sqrt{a^2 . \dfrac{1}{n}\displaystyle\sum_{i=1}^{n}(x_i - \overline{x})^2} = |\,a\,|\sigma$