

## Worksheet – ch2

**Q1)** A teacher records the weights (in kg) of 10 students in her class as follows: 45, 50, 50, 55, 60, 60, 65, 70, 75, 80. Based on this data, which of the following statements is true?

- A) The mean weight of the students is greater than the median weight.
- B) The mode of the weights is the same as the median weight.
- C) The median weight of the students is less than the mode weight.
- D) The mean weight is equal to the mode weight.

**Q2)** A researcher collected the weights of a sample of 10 students (in kg): 55, 60, 62, 58, 65, 70, 59, 61, 64, 63. What is the variance of the weights of these students?

- A) 61.7
- B) 9.2
- C) 17.32
- D) 155.9

**Q3)** A researcher collected the heights (in centimeters) of a sample of 100 students. The heights are sorted in ascending order. To find the 24th percentile, which of the following values represents the height at the 24th percentile?

A) The height of the 24th student in the ordered list

B) The average height of the 24th and 25th students in the ordered list

C) The height of the student at

position  $0.24 \times (100+1) = 24.84$  in the ordered list

D) The height of the student at position  $0.24 \times 100 = 24$  in the ordered list

**Q4)** Assume we have a data set: 3, 5, 7, 8, 12, 14, 15, 18. Then IQR is

A) 8.5

B) 6

C) 10

D) 14.5

**Q5)** Given the following data set representing the ages of participants in a study:

22,25,27,29,30,31,32,35,40,100

Which of the following values can be considered an outlier

- A) 22
- B) 30
- C) 100
- D) 29

**Q6)** A data set has a mean of  $\bar{x} = 10$  and a variance of  $s^2 = 4$ . If every observation in the data set is increased by 5, what will be the new mean and variance of the data set?

- A) New Mean = 15, New Variance = 4
- B) New Mean = 15, New Variance = 9
- C) New Mean = 10, New Variance = 4
- D) New Mean = 10, New Variance = 9

**Q7)** for the following ordered set of data  $A, 2, 3, 5, B, 9, 10, C$ ,  $\bar{x} = 7$ , *median* = 6 and *mode* = 2 find A, B, C

Worksheet – ch2

Q1) A teacher records the weights (in kg) of 10 students in her class as follows: 45, 50, 50, 55, 60, 60, 65, 70, 75, 80. Based on this data, which of the following statements is true?

- A) The mean weight of the students is greater than the median weight.  $\bar{x} > med$
- B) The mode of the weights is the same as the median weight.
- C) The median weight of the students is less than the mode weight.
- D) The mean weight is equal to the mode weight.

$$\text{mean} = \bar{x} = \frac{\sum x_i}{n} = \frac{45 + 50 + 50 + 55 + 60 + 60 + 65 + 70 + 75 + 80}{10} = \frac{610}{10} = 61$$

$$\text{med} = \frac{60 + 60}{2} = 60$$

$$61 > 60 \quad \checkmark$$

$$\text{mode} = 50, 60 \quad \text{Bimodal.}$$

Q2) A researcher collected the weights of a sample of 10 students (in kg): 55, 60, 62, 58, 65, 70, 59, 61, 64, 63. What is the variance of the weights of these students?

A) 61.7

B) 9.2

C) 17.32

D) 155.9

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

$$2) \bar{x} = \frac{55 + 60 + 62 + 58 + 65 + 70 + 59 + 61 + 64 + 63}{10} = \frac{617}{10} = 61.7$$

$$3) \left. \begin{aligned} (x_i - \bar{x})^2 &= (55 - 61.7)^2 = 44.89 \\ (60 - 61.7)^2 &= 2.89 \\ (62 - 61.7)^2 &= 0.09 \\ (58 - 61.7)^2 &= 13.69 \\ (65 - 61.7)^2 &= 10.89 \\ (70 - 61.7)^2 &= 68.89 \\ (61 - 61.7)^2 &= 0.49 \\ (64 - 61.7)^2 &= 5.29 \\ (63 - 61.7)^2 &= 1.69 \\ (59 - 61.7)^2 &= 7.29 \end{aligned} \right\} \sum (x_i - \bar{x})^2 = 156.1$$

$$s^2 = \frac{156.1}{9} = 17.3$$

ex Find CV ??

$$CV = \frac{s}{\bar{x}} \cdot 100\% = \frac{\sqrt{17.3}}{61.7} \cdot 100\% = 6.7\%$$

**Q3)** A researcher collected the heights (in centimeters) of a sample of 100 students. The heights are sorted in ascending order. To find the 24th percentile, which of the following values represents the height at the 24th percentile?

A) The height of the 24th student in the ordered list

B) The average height of the 24th and 25th students in the ordered list

C) The height of the student at

position  $0.24 \times (100+1) = 24.84$  in the ordered list

D) The height of the student at position  $0.24 \times 100 = 24$  in the ordered list

$$24^{\text{th}} \text{ percentile} \Rightarrow \frac{nP}{100} = \frac{100(24)}{100} = 24 \rightarrow \text{Integer}$$

$$24^{\text{th}} = \frac{X_{[24]} + X_{[25]}}{2}$$

**Q4)** Assume we have a data set: 3, 5, 7, 8, 12, 14, 15, 18. Then IQR is

A) 8.5

B) 6

C) 10

D) 14.5

$$\boxed{1} \quad IQR = Q_3 - Q_1$$

$$\boxed{2} \quad Q_1 \Rightarrow \frac{nP}{100} = \frac{8(25)}{100} = 2 \text{ integer}$$

$$Q_1 = \frac{X_{[2]} + X_{[3]}}{2} = \frac{5 + 7}{2} = \boxed{6 = Q_1}$$

$$Q_3 \Rightarrow \frac{nP}{100} = \frac{8(75)}{100} = 6$$

$$Q_3 = \frac{X_{[6]} + X_{[7]}}{2} = \frac{14 + 15}{2} = \boxed{14.5 = Q_3}$$

$$\boxed{3} \quad IQR = 14.5 - 6 = 8.5$$

**Q5)** Given the following data set representing the ages of participants in a study:

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Which of the following values can be considered an outlier

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B) 30

C) 100

D) 29

1)  $[Q_1 - 1.5 IQR, Q_3 + 1.5 IQR]$

2)  $Q_1 \rightarrow \frac{10(25)}{100} = [2.5] = 3 \rightarrow Q_1 = X_{(3)} = 27$

$Q_3 \rightarrow \frac{10(75)}{100} = [7.5] = 8 \rightarrow Q_3 = X_{(8)} = 35$

3)  $IQR = Q_3 - Q_1 = 35 - 27 = 8$

4)  $1.5 IQR = \frac{3}{2}(8) = 12$

5)  $Q_1 - 12 = 27 - 12 = 15$   
 $Q_3 + 12 \Rightarrow 35 + 12 = 47$

6) outlier  $[15, 47]$  outlier  
 $\uparrow \quad \uparrow \quad \uparrow$   
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**Q6)** A data set has a mean of  $\bar{x} = 10$  and a variance of  $s^2 = 4$ . If every observation in the data set is increased by 5, what will be the new mean and variance of the data set?

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C) New Mean = 10, New Variance = 4

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$x_i \rightarrow y_i$   
 $y = x + 5$

$\bar{y} = \bar{x} + 5 = 10 + 5 = 15$

$s_y^2 = 4$

ex find  $CV_x$  ??

$CV = \frac{s_x}{\bar{x}} \cdot 100 = \frac{2}{10} \cdot 100 \% = 20\%$

**Q7)** for the following ordered set of data  $A, 2, 3, 5, B, 9, 10, C$ ,  $\bar{x} = 7$ , median = 6 and mode = 2 find A, B, C

$$A = 2$$

$$\text{med} = \frac{5+B}{2} = 6 \Rightarrow B = 12 - 5 = 7.$$

2, 2, 3, 5, 7, 9, 10, C

$$\bar{x} = \frac{\sum x_i}{n} = \frac{2+2+3+5+7+9+10+C}{8} = 7.$$

$$38 + C = 56$$

$$C = 56 - 38 = 18.$$