Statistics

Question1

The mean deviation about the mean for the date $4, 7, 8, 9, 10, 12, 13, 17$ is

KCET 2025

Options:

A. 10

B. 3

C. 8.5

D. 4.03

Answer: B

Solution:

$$\text{Mean derivation about mean } \mu = \frac{4+7+8+9+10+12+13+17}{8}$$

$$\frac{1}{\mathrm{N}}\sum(\mathrm{xi}-\mu) \quad = \frac{80}{8} = 10$$

$$= \frac{1}{8}(6+3+2+1+2+3+7) \quad = \frac{24}{8} = 3$$

Question2

Let a, b, c, d and e be the observations with mean m and standard deviation S. The standard deviation of the observations $a+k$, $b+k, c+k, d+k$ and $e+k$ is

KCET 2024

Options:

A. kS

B. $S + k$

C. $\frac{S}{k}$

D. S

Answer: D

Solution:

The given observation are a, b, c, d and e

$$\text{Mean } = m = \frac{a+b+c+d+e}{5}$$

$$\Rightarrow \quad \Sigma x_i = a+b+c+d+e = 5m$$

$$\therefore \text{ Standard deviation, } S = \sqrt{\frac{\Sigma x_i^2}{5} - m^2}$$

Now, consider the observations $a+k, b+k, c+k, d+k, e+k$.

Now, mean

$$\text{mean}$$

$$= \frac{(a+k)+(b+k)+(c+k)+(d+k)+(e+k)}{5}$$

$$= \frac{a+b+c+d+e+5k}{5}$$

$$= \frac{5m+5k}{5} = m+k$$

$\therefore$ New standard devaition $= \sqrt{\frac{\sum (x_i + k)^2}{5} - (m + k)^2}$

$= \sqrt{\frac{\sum \left(x_i^2 + k^2 + 2x_i k\right)}{5} - (m^2 + k^2 + 2mk)}$

$= \sqrt{\frac{\sum x_i^2}{5} - m^2 + \frac{5k^2}{5} - k^2 + \frac{2k\Sigma x_i}{5} - 2mk}$

$= \sqrt{\frac{\sum x_i^2}{5} - m^2 + \frac{2k \times 5m}{5} - 2mk}$

$= \sqrt{\frac{\sum x_i^2}{5} - m^2} = S$

Question3

The mean of 100 observations is 50 and their standard deviation is 5. Then, the sum of squares of all observations is

KCET 2023

Options:

A. 252500

B. 250000

C. 255000

D. 50000

Answer: A

Solution:

We know, standard deviation,

$$P^2 = \frac{\Sigma x^2}{n} - (\bar{x})^2$$
$$P = 5, \Sigma x = 50, n = 100$$

$$\Rightarrow \quad 25 = \frac{\Sigma x^2}{100} - (50)^2$$
$$\Rightarrow \quad \Sigma x^2 = 252500$$

Thus, sum of squares of all observation in 252500.

Question4

If the standard deviation of the numbers $-1, 0, 1, k$ is $\sqrt{5}$ where $k > 0$, then k is equal to

KCET 2022

Options:

A. $4\sqrt{\frac{5}{3}}$

B. $\sqrt{6}$

C. $2\sqrt{\frac{10}{3}}$

D. $2\sqrt{6}$

Answer: D

Solution:

Given, numbers are $-1, 0, 1, k$.

Standard deviation, $\sigma = \sqrt{5}$

$$\sigma^2 = \frac{\Sigma x_i^2}{n} - \left(\frac{\Sigma x_i}{n}\right)^2$$

$$\Rightarrow \quad 5 = \frac{1 + 0 + 1 + k^2}{4} - \left(\frac{-1 + 0 + 1 + k}{4}\right)^2$$
$$\Rightarrow \quad 5 = \frac{2 + k^2}{4} - \frac{k^2}{16} \Rightarrow 80 = 8 + 4k^2 - k^2$$
$$\Rightarrow \quad 72 = 3k^2 \Rightarrow k^2 = 24 \Rightarrow k = 2\sqrt{6}$$

Question5

The standard deviation of the numbers $31, 32, 33 \ldots 46, 47$ is

KCET 2021

Options:

A. $\sqrt{\frac{17}{12}}$

B. $\sqrt{\frac{47^2-1}{12}}$

C. $2\sqrt{6}$

D. $4\sqrt{3}$

Answer: C

Solution:

Given, numbers : $31, 32, 33, \ldots, 46, 47$.

The standard deviation of $31, 32, 33, \ldots, 47$ will be the same as those of $1, 2, 3, \ldots, 17$. (decreasing each item by 30)

$\because \quad \text{SD} = \sqrt{\frac{n^2-1}{12}}$

Here, $\quad n = 17$

$$\therefore \quad \text{SD} = \sqrt{\frac{17^2-1}{12}} = \sqrt{\frac{288}{12}}$$
$$= \sqrt{24} = 2\sqrt{6}$$

Question6

The standard deviation of the data 6, 7, 8, 9, 10 is

KCET 2020

Options:

A. $\sqrt{2}$

B. $\sqrt{10}$

C. 2

D. 10

Answer: A

Solution:

Given data $6, 7, 8, 9, 10$

$$\bar{x} = \frac{6+7+8+9+10}{5} = 8$$

$$\text{SD} = \sqrt{\frac{\Sigma x_i^2}{n} - (\bar{x})^2}$$

$$\text{SD} = \sqrt{\frac{6^2+7^2+8^2+9^2+10^2}{5} - (8)^2}$$

$$\text{SD} = \sqrt{\frac{36+49+64+81+100-320}{5}}$$

$$\text{SD} = \sqrt{\frac{330-320}{5}} = \sqrt{\frac{10}{5}} = \sqrt{2}$$

Question7

Mean and standard deviation of 100 items are 50 and 4 , respectively. The sum of all squares of the items is

KCET 2019

Options:

A. 266000

B. 251600

C. 261600

D. 256100

Answer: B

Solution:

Key Idea Use mean $(\bar{x}) = \frac{\sum_{i=1}^{n} x_i}{n}$ and standard deviation (S.D) $= \sqrt{\frac{\sum_{i=1}^{n} xi^2}{n} - \left(\frac{\sum_{i=1}^{n} xi}{n}\right)^2}$

Given, $\frac{\sum_{i=1}^{100} xi}{100} = 50$

and $= \sqrt{\frac{\sum_{i=1}^{100} xi^2}{100} - \left(\frac{\sum_{i=1}^{100} xi}{100}\right)^2} = 4$

$\Rightarrow \frac{\sum_{i=1}^{100} xi^2}{100} - (50)^2 = (4)^2 \Rightarrow \sum_{i=1}^{100} xi^2 = 100(2500 + 16)$

$= 251600$

Question8

For the probability distribution given by

$X = x_i$	0	1	2
P_i	$\frac{25}{36}$	$\frac{5}{18}$	$\frac{1}{36}$

the standard deviation (σ) is

KCET 2018

Options:

A. $\sqrt{\frac{1}{3}}$

B. $\frac{1}{3}\sqrt{\frac{5}{2}}$

C. $\sqrt{\frac{5}{36}}$

D. None of these

Answer: B

Solution:

Probability distribution given by

$X = x_i$	P	$P_i x_i$	$P_i x_i^2$
0	$\frac{25}{36}$	0	0
1	$\frac{5}{18}$	$\frac{5}{18}$	$\frac{5}{18}$
2	$\frac{1}{36}$	$\frac{2}{36}$	$\frac{4}{36}$
		$\sum P_i x_i = \frac{1}{3}$	$\sum P_i x_i^2 = \frac{7}{18}$

Standard deviation

$$\sigma = \sqrt{\Sigma P_i x_i^2 - (\Sigma P_i x_i)^2}$$

$$= \sqrt{\frac{7}{18} - \left(\frac{1}{3}\right)^2} = \sqrt{\frac{7}{18} - \frac{1}{9}}$$

$$= \sqrt{\frac{5}{18}} = \frac{1}{3}\sqrt{\frac{5}{2}}$$

Question9

If coefficient of variation is 60 and standard deviation is 24 , then Arithmetic mean is

KCET 2017

Options:

A. 40

B. $7/20$

C. $20/7$

D. $1/40$

Answer: A

Solution:

We are given:

Coefficient of Variation (CV) = 60

Standard Deviation (σ) = 24

To find the Arithmetic Mean ($\bar{x}$), we use the formula for the Coefficient of Variation:

$CV = \frac{\sigma}{\bar{x}} \times 100$

Substituting the given values:

$60 = \frac{24}{\bar{x}} \times 100$

To solve for $\bar{x}$, rearrange the equation:

$\bar{x} = \frac{24 \times 100}{60}$

Simplifying the expression:

$\bar{x} = 40$

Therefore, the Arithmetic Mean is 40.
