MATHS

BOOKS - CENGAGE PUBLICATION

STATISTICS

Illustration

1. If a variate x is expressed as a linear function of two variates u and v in the form $x = au + bv$, then mean $\bar{x}$ of x is

A. a) $a\overline{U} - b\overline{V}$

B. b) $\overline{U} + \overline{V}$

C. c) $b\overline{U} + a\overline{V}$

D. d) None of these

Answer: D

2. If the mean of the numbers 27+x, 31+x, 89+x, 107+x, 156+x is 82,

then the mean of 130+x, 126+x, 68+x, 50+x, 1+x is

A. 75

B. 157

C. 82

D. 80

Answer: A

3. If the arithmetic mean of the numbers $x_1, x_2, x_3, ..., x_n$ is $\bar{x}$, then the arithmetic mean of the numbers $ax_1 + b, ax_2 + b, ax_3 + b, ..., ax_n + b$, where a, b are two constants, would be

A. $\bar{x}$

B. $na\bar{x} + nb$

C. $a\bar{x}$

D. $a\bar{x} + b$

Answer: D

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4. the weighted mean of first n natural numbers whose weights are equal to the squares of corresponding numbers , is

A. $\dfrac{n+1}{2}$

B. $\dfrac{3n(n+1)}{2(2n+1)}$

C. $\dfrac{(n+1)(2n+1)}{6}$

D. $\dfrac{n(n+1)}{2}$

Answer: B

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5. A student obtain 75% , 80% and 85% in three subjects if

the marks of another subject are added. Then the average cannot

be less than

A. 0.6

B. 0.65

C. 0.8

D. 0.9

Answer: A

6. If $\overline{x_1}$ and $\overline{x_2}$ are the means of two distributions such that $\overline{x_1} < \overline{x_2}$ and $\overline{x}$ is the mean of the combined distriubtion, then

A. $\overline{x} < \overline{x_1}$

B. $\overline{x} > \overline{x_2}$

C. $\overline{x} = \dfrac{\overline{x_1} + \overline{x_2}}{2}$

D. $\overline{x_1} < \overline{x} < \overline{x_2}$

Answer: D

7. 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. The correct mean is. (a) 48 (b) $82\frac{1}{2}$ (c) 50 (d) 80

A. 48

B. 82.5

C. 50

D. 80

Answer: C

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8. The mean weight per student in a group of 7 students is 55 kg. The individual weights of 6 of them (in kg) are 52, 54,55, 53, 56

and 54. Find the weight of the seventh student.

A. 61 kg

B. 60 kg

C. 57 kg

D. 50 kg

Answer: C

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9. If a variable takes the discrete values

$$\alpha + 4, \alpha - \frac{7}{2}, \alpha - \frac{5}{2}, \alpha - 3, \alpha - 2, \alpha + \frac{1}{2}, \alpha - \frac{1}{2}, \alpha + 5 (\alpha > 0)$$

then the median is

A. $\alpha - \frac{5}{4}$

B. $\alpha - \frac{1}{2}$

C. $\alpha - 2$

D. $\alpha + \dfrac{5}{4}$

Answer: A

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10. The median of a set of 9 distinct observations 20.5. If each of the largest 4 observation of the set is increased by 2, then the median of the new set

A. Is increased by 2

B. In decreased by 2

C. Is two times the original median

D. Remains the same as that of the original set

Answer: D

11. If in a moderately asymmetrical distribution the mode and the mean of the data are 6λ and 9λ, respectively, then the median is

A. 8λ

B. 7λ

C. 6λ

D. 5λ

Answer: A

12. The mean deviation about the mean of the following distribution is

Size	20	21	22	23	24
Frequency	6	4	5	1	4

A. 1

B. 1.25

C. 1.5

D. 1.75

Answer: B

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13. The mean deviation about the median of the following distribution is

Marks obtained	10	11	12	14	15
Number of students	2	3	8	3	4

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14. The S.D of the first n natural numbers is

A. $\dfrac{n^2 - 1}{12}$

B. $\dfrac{n^2 - 1}{6}$

C. $\dfrac{n^2 + 1}{6}$

D. $\dfrac{n^2 + 1}{12}$

Answer: A

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15. The mean of five observations is 4 and their variance is 5.2. If three of these observations are 1,2 and 6, then the other two are

A. 2 and 9

B. 3 and 8

C. 4 and 7

D. 5 and 6

Answer: C

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16. The standard deviation of data 6,5,9,13,12,8 and 10 is

A. $\sqrt{\dfrac{52}{7}}$

B. $\dfrac{52}{7}$

C. $\sqrt{6}$

D. 6

Answer: A

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17. Consider the frequency distribution, where A is a positive interger : variance is 160.

x	A	$2A$	$3A$	$4A$	$5A$	$6A$
f	2	1	1	1	1	1

18. Find The standard deviation of the following frequency distribution is

X	2	3	4	5	6	7
f	4	9	16	14	11	6

A. 1.38

B. 1.42

C. 1.45

D. 1.60

Answer: A

19. Let a, b, c, d, 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, e+k is

A. s

B. ks

C. s+k

D. $\dfrac{s}{k}$

Answer: A

1. In a class of 100 students there are 70 boys whose average marks in subject are 75. If the average marks of the complete class are 72, then the average marks of the girls

A. 73

B. 65

C. 68

D. 74

Answer: B

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2. The median of a set of 9 distinct observations 20.5. If each of the largest 4 observation of the set is increased by 2, then the median of the new set

    A. Is increased by 2

    B. In decreased by 2

    C. Is two times the original median

    D. Remains the same as that of the original set

Answer: D

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3. If in a frequency distribution, the mean and median are 21 and 22 respectively, then its mode is approximately.

(a) 20.5

(b) 22.0

(c) 24.0

(d) 25.5

A. 22.0

B. 20.5

C. 25.5

D. 24.0

Answer: D

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4. The average marks of boys in a class is 52 and that of girls is 42. The average marks of boys and girls combined is 50. The percentage of boys in the class is (1) 40 (2) 20 (3) 80 (4) 60

A. 40

B. 20

C. 80

D. 60

Answer: C

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5. Compute the median from the following table

Marks obtained	No. of students
0 10	2
10 20	18
20 30	30
30 40	45
40 50	35
50 60	20
60 70	6
70 80	3

A. 36.55

B. 35.55

C. 40.05

D. None of these

Answer: A

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Exercise 11 2

1. In an experiment with 15 observations of x the following results were available $\sum x^2 = 2830 \sum x = 170$ one observation that was 20 was found to be wrong and it was replaced by its correct value of 30 Then the corrected variance is (1) 8.33 (2) 78 (3) 188.66 (4) 177.33

A. 78.00

B. 188.66

C. 177.33

D. 8.33

Answer: A

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2. In a series of $2n$ observations, half of them equal a end remaining half equal $-a$. If the S.D. of the observationsis 2, then $|a|$ equals

(1) $\dfrac{1}{n}$

(2) $\sqrt{2}$

(3) 2

(4) $\dfrac{\sqrt{2}}{n}$

A. $\dfrac{1}{n}$

B. $\sqrt{2}$

C. 2

D. $\dfrac{\sqrt{2}}{n}$

Answer: C

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

(a) 1

(b) $\dfrac{9}{4}$

(c) $\dfrac{4}{9}$

(d) $\dfrac{2}{3}$

A. 1

B. $9/4$

C. $4/9$

D. $2/3$

Answer: A

4. The mean of the numbers a, b, 8, 5, 10 is 6 and the variance is 6.80. Then which one of the following gives possible values of a and b? (1) $a = 0, b = 7$ (2) $a = 5, b = 2$ (3) $a = 1, b = 6$ (4) $a = 3, b = 4$

A. a=0, b=7

B. a=5, b=2

C. a=1, b =6

D. a=3, b=4

Answer: D

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5. Let x_1, x_2, x_3, x_4, x_5 be the observations with mean m and standard deviation s. The standard deviation of the observations $kx_1, kx_2, kx_3, kx_4, kx_5$ is

A. 1. k+s

B. 2. $\dfrac{s}{k}$

C. 3. ks

D. 4. s

Answer: C

6. Let $1x_1, x_2 \ldots x_n$ be n obervations .Let

$w_i = lx_i + k$ for $i = 1, 2 \ldots n$, where l and k are constants. If

the mean of x_i is 48 and their standard deviation is 12 the mean

of w_i 's is 55 and standard deviation of w_i is 15 then the value of l

and k should be

A. a. l=2.5, k=5

B. b. l=-1.25, k=5

C. c. l=2.5, k=-5

D. d. l=1.25, k=-5

Answer: D

1. Coefficients of variation of two distributions are 50 and 60, and their arithmetic means are 30 and 25, respectively. Difference of their standard deviations is

a. 0

b. 1

c. 1.5

d. 2.5

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2. The mean of a set of numbers is $\overline{X}$. If each number is divided by 3, then the new mean is

A. $\overline{X}$

B. $\overline{X} + 3$

C. $3\overline{X}$

D. $\dfrac{\overline{X}}{3}$

Answer: D

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3. The A.M of the series 1, 2, 4, 8, 16...., 2^n is

A. $\dfrac{2^n - 1}{n}$

B. $\dfrac{2^{n+1} - 1}{n + 1}$

C. $\dfrac{2^n + 1}{n}$

D. $\dfrac{2^n - 1}{n + 1}$

Answer: B

4. The mean of n observations is $\overline{X}$. If the first item is increased by 1, second by 2 and so on, then the new mean is___

A. $\overline{X} + n$

B. $\overline{X} + \dfrac{n}{2}$

C. $\overline{X} + \dfrac{n+1}{2}$

D. None of these

Answer: C

5. For a slightly asymmetric distribution, mean and medain are 5 and 6, respectively. What is its mode ?

A. 8

B. 11

C. 6

D. None of these

Answer: A

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6. For a normal distribution if the mean is M, mode is M_0 and median is M_d, then

A. $M > M_d > M_0$

B. $M < M_d < M_0$

C. $M = M_d M_0$

D. $M = M_d = M_0$

Answer: D

7. The following data give the distribution of heights of students :

Height (in cm)	160	150	152	161	156	154	155
Numbers of students	12	8	4	4	3	3	7

The median of the distribution is

A. 154

B. 155

C. 160

D. 161

Answer: B

8. An automobile driver travels from a plain to a hill station 120 km away at an average speed of 30 km per hour. He then makes the return trip at an average speed 25 km per hour. He covers another 120 km on the plain at an average speed of 50 km per hour. His average speed (in km/hr) over the entire distance of 360 km will be

A. $\dfrac{30 + 25 + 50}{3}$

B. $\dfrac{\frac{a}{30} + \frac{1}{25} + \frac{1}{50}}{3}$

C. $\dfrac{3}{\frac{1}{30} + \frac{1}{25} + \frac{1}{50}}$

D. None of these

Answer: C

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9. The mean deviation of the data 3,10,10,4,7,10,5 from the mean is

A. 2

B. 2.57

C. 3

D. 3.75

Answer: B

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10. when tested the lives (in hours) of 5 bulbs were noted as follows 1357,1090,1666,1494,1623

The mean deviations (in hours) from their mean is

A. 178

B. 179

C. 220

D. 356

Answer: A

11. Following are the marks obtained by 9 student in a

mathematics test

50,69,20,33,53,39,40,65,59,

The mean deviation from the median is

A. 9

B. 10.5

C. 12.67

D. 14.76

Answer: C

12. If the mean of the distribution is 2.6, then the value of y is

Variable x	1	2	3	4	5
Frequency f of x	4	5	y	1	2

A. a. 24

B. b. 13

C. c. 8

D. d. 3

Answer: C

13. If the mean of the set of numbers $x_1, x_2, x_3, \ldots, x_n$ is $\bar{x}$, then the mean of the numbers $x_i + 2i, 1 \leq i \leq n$ is

A. $\bar{x} + 2n$

B. $\bar{x} + n + 1$

C. $\bar{x} + 2$

D. $\bar{x} + n$

Answer: B

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14. The harmonic mean of 4,8,16 is

A. 6.4

B. 6.7

C. 6.85

D. 7.8

Answer: C

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15. The average of n numbers $x_1, x_2, x_3, . . , x_n$ is M. If x_n is replaced by x', then new average is

A. $M - x_n + x'$

B. $\dfrac{nM - x_n + x'}{n}$

C. $\dfrac{(n-1)M + x'}{n}$

D. $\dfrac{M - x_n + x'}{n}$

Answer: B

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16. The following data give the distribution of heights of students

:

Height (in cm)	160	150	152	161	156	154	155
Numbers of students	12	8	4	4	3	3	7

The median of the distribution is

A. 154

B. 155

C. 160

D. 161

Answer: B

17. For a slightly asymmetric distribution, mean and medain are 5 and 6, respectively. What is its mode ?

A. 5

B. 6

C. 7

D. 8

Answer: D

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18. Runs scored by a batsman in 10 innings are : 38, 70,48,34,42,55,63,46,54,44

The mean deviation about median is

A. 8.6

B. 6.4

C. 10.6

D. 9.6

Answer: A

19. If μ is the mean of a distribution , then $\sum f_i(y_i - \mu)$ is equal to

A. M.D.

B. S.D.

C. 0

D. Relative frequency

Answer: C

20. The range of the following set of observations

$2, 3, 5, 9, 8, 7, 6, 5, 7, 4, 3$ is

A. 11

B. 7

C. 5.5

D. 6

Answer: B

21. If each observation of a raw data whose variance is σ is multiplied by h, then the variance of the new set is

A. σ^2

B. $h^2\sigma$

C. $h\sigma^2$

D. $h + \sigma^2$

Answer: B

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22. If a variable x takes values 0,1,2,..,n with frequencies proportional to the binomial coefficients $.^n C_0, .^n C_1, .^n C_2, \ldots, .^n C_n$, then var (X) is

A. a. $\dfrac{n^2 - 1}{12}$

B. b. $\dfrac{n}{2}$

C. c. $\dfrac{n}{4}$

D. d.None of these

Answer: C

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23. Variance of the data 2,4,6,8,10 is

A. 6

B. 7

C. 8

D. None of these

Answer: C

24. If the standard deviation of $0, 1, 2, 3...9$ is K, then the standard deviation of $10, 11, 12, 13....19$ is

A. a.K

B. b.K+10

C. c.$K + \sqrt{10}$

D. d.10 K

Answer: A

25. For a given distribution of marks, the mean is 35.16 and its standard deviation is 19.76. The coefficient of variation is

A. $\dfrac{35.16}{19.76}$

B. $\dfrac{19.76}{35.16}$

C. $\dfrac{35.16}{19.76} \times 100$

D. $\dfrac{19.76}{35.16} \times 100$

Answer: D

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26. The mean and S.D of 1, 2, 3, 4, 5, 6 is

A. $\dfrac{7}{2}, \sqrt{\dfrac{35}{2}}$

B. 3, 3

C. $\dfrac{7}{2}, \sqrt{3}$

D. 3, $\dfrac{35}{12}$

Answer: A

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27. The standard deviation of 25 numbers is 40. If each of the numbers in increased by 5, then the new standard deviation will be -

A. 40

B. 45

C. $40 + \dfrac{21}{25}$

D. None of these

Answer: A

28. Consider any set of observations $x_1, x_2, x_3, . . , x_{101}$. It is given that $x_1 < x_2 < x_3 < . . < x_{100} < x_{101}$, then the mean deviation of this set of observations about a point k is minimum when k equals

A. x_1

B. x_{51}

C. $\dfrac{x_1 + x_2 + . . + x_{101}}{101}$

D. x_{50}

Answer: B

29. For (2n+1) observations $x_1, -x_1, x_2, -x_2, \ldots, x_n, -x_n$ and 0, where all x's are distinct, let SD and MD denote the standard deviation and median, respectively. Then which of the following is always true ?

A. 1.$SD < MD$

B. 2.$SD > MD$

C. 3.SD=MD

D. 4.Nothing can be said in general about the relationship between SD and MD

Answer: B

30. If $\bar{x}$ is the mean of n observations $x_1, x_2, x_3 \ldots \ldots x_n$, then the value of $\sum_{i=1}^{n} (x_i - \bar{x})$ is (i) -1 (ii) 0 (iii) 1 (iv) n-1

A. $S \leq r \sqrt{\dfrac{n}{n-1}}$

B. $S = r \sqrt{\dfrac{n}{n-1}}$

C. $S \geq r \sqrt{\dfrac{n}{n-1}}$

D. None of these

Answer: A

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31. If the standard deviation of a variable x is σ , then standard deviation of variable $\dfrac{aX + b}{c}$ is (a).σ (b) $\dfrac{a}{c}\sigma$ (c) $\left|\dfrac{a}{c}\right|\sigma$ (d) $\dfrac{a\sigma + b}{c}$

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32. The standard deviation of the data 6,5,9,13,12,8,10 is

A. $\sqrt{\dfrac{52}{7}}$

B. $\dfrac{52}{7}$

C. $\sqrt{6}$

D. 6

Answer: A

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33. If the mean of 100 observations is 50 and their standard deviations is 5,than the sum of all squares of all the observations is

A. 50000

B. 250000

C. 252500

D. 255000

Answer: C

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34. The standard deviation of first 10 natural numbers is

A. 5.5

B. 3.87

C. 2.97

D. 2.87

Answer: D

35. Consider the numbers 1,2,3,4,5,6,7,8,9,10. If 1 is added to each number, the variance of the numbers so obtained is

A. 6.5

B. 2.87

C. 3.87

D. 8.25

Answer: D

36. Consider the first 10 positve integers .If we multiply each number by -1 and then add 1 to each number,the variance of the

number so obtained

A. 8.25

B. 6.5

C. 3.87

D. 2.87

Answer: A

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37. If for a sample of size 60, we have the following information $\sum \xi^2 = 18000 and \sum \xi = 960$, then the variance is

A. 6.63

B. 16

C. 22

D. 44

Answer: D

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38. The standard deviation of some temperature data in $.^\circ C$ is 5 .If the data were converted into $.^\circ F$ then variance would be

A. 81

B. 57

C. 36

D. 25

Answer: A

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39. What is the standard deviation of the following data ?

Measurement	$0 - 10$	$10 - 20$	$20 - 30$	$30 - 40$
Frequency	1	3	4	2

(a) 81 (b) 7.6 (c) 9 (d) 2.26

A. 81

B. 7.6

C. 9

D. 2.26

Answer: C

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Archives

1. If the mean deviation of the numbers $1, 1 + d, 1 + 2d, \ldots, 1 + 100d$ from their mean is 255, then the d is equal to

A. 10.0

B. 20.0

C. 10.1

D. 20.2

Answer: C

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2. In a binomial distribution $B\left(n, p = \dfrac{1}{4}\right)$, if the probability of at least one success is greater than or equal to $\dfrac{9}{10}$, then n is greater than (1) $\dfrac{1}{(\log)_{10}^{4} - (\log)_{10}^{3}}$

(2) $\dfrac{1}{(\log)_{10}^{4} + (\log)_{10}^{3}}$

(3) $\dfrac{9}{(\log)_{10}^{4} - (\log)_{10}^{3}}$

(4) $\dfrac{4}{(\log)_{10}^{4} - (\log)_{10}^{3}}$

A. $\dfrac{1}{\log_{10}4 - \log_{10}3}$

B. $\dfrac{1}{\log_{10}4 + \log_{10}3}$

C. $\dfrac{9}{\log_{10}4 - \log_{10}3}$

D. $\dfrac{4}{\log_{10}4 - \log_{10}3}$

Answer: A

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3. For two data sets, each of size 5, the variances are given to be 4 and 5 and the corresponding means are given to be 2 and 4, respectively. The variance of the combined data set is

(1) $\dfrac{11}{2}$

(2) 2

(3) $\dfrac{13}{2}$

(4) $\dfrac{5}{2}$

4. If the mean deviation about the median of the numbers a, 2a, ..., 50a is 50, then |a| equals :

(1) 2

(2) 3

(3) 4

(4) 5

A. 5

B. 2

C. 3

D. 4

5. Let $x_1, x_2, \ldots \ldots, x_n$ be n observations, and let $\bar{x}$ be their arithematic mean and σ^2 be their variance. Statement 1: Variance of $2x_1, 2x_2, \ldots \ldots, 2x_n$ is $4\sigma^2$. Statement 2: Arithmetic mean of $2x_1, 2x_2, \ldots \ldots, 2x_n$ is $4x$. (1) Statement 1 is false, statement 2 is true (2) Statement 1 is true, statement 2 is true; statement 2 is a correct explanation for statement 1 (3) Statement 1 is true, statement 2 is true; statement 2 is not a correct explanation for statement 1 (4) Statement 1 is true, statement 2 is false

A. a.Statement 1 is false, statement 2 is true.

B. b.Statement 1 is true, statement 2 is true, statement 2 is a

correct explanation for statement 1.

C. c.Statement 1 is true, statement 2 is true , statement 2 is

not a correct explanation for statement 1.

D. d.Statement 1 is true, statement 2 is false.

Answer: D

6. All the students of a class perfomed poorly in mathematic. The

techer decided to give grace marks of 10 to every student Which

of the following statistical measure will not change even after the

grace marks were given ?

A. median

B. mode

C. variance

D. mean

Answer: c

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7. the variance of first 50 even natural numbers is ,

A. $\dfrac{833}{4}$

B. 833

C. 437

D. $\dfrac{437}{4}$

Answer: B

8. The mean of the data set comprising of 16 observations is 16 . If one of the observation valued 16 is deleted and three new observations valued 3, 4 and 5 are added to the data then mean of the resultant data is :

A. 16.8

B. 16.0

C. 15.8

D. 14.0

Answer: D

9. If the standard deviation of the numbers 2, 3, a and 11 is 3.5, then which of the following is true ?

A. $3a^2 - 32a + 84 = 0$

B. $3a^2 - 34a + 91 = 0$

C. $3a^2 - 23a + 44 = 0$

D. $3a^2 - 26a + 55 = 0$

Answer: A

10. If $\sum_{i=1}^{9} (x_i - 5) = 9$ and $\sum_{i=1}^{9} (x_i - 5)^2 = 45$, then the standard deviation of the 9 items $x_1, x_2, \ldots, x_9$ is

A. 3

B. 9

C. 4

D. 2

Answer: D

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