MATHS

JEE (MAIN AND ADVANCED) MATHEMATICS

MEASURES OF DISPERSION (STATISTICS)

Example

1. Find the mean deviation from the mean of observations -1, 0, 4 ?

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2. Find the mean deviation from the median of the observations 1, 2, 3, 4 ?

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Solved Example

1. Find the mean deviation of the set of of numbers 3, 10, 9, 4, 7, 9, 14 fromMean and Median and show that mean deviation from Mean is greater than that from Median

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2. Find the mean deviation about the mean for the following data.

Marks obtained	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of students	2	3	8	14	8	3	2

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3. If S.D of $x_1, x_2, \ldots\ldots, x_n$ is σ then the S.D of $-x_1, -x_2, \ldots\ldots, -x_n$ is

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4. The standard deviation of 15 items is 6 and each item is decreased by 1. Then find the standard deviation of

new data.

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5. The sum of 10 items is 12 and sum of their squares is 18, then find the standard deviation ?

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6. If the coefficient of variation of 45% and the mean is 12 then find its s.d ?

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7. Find the variance and standard deviation for the following data :

x_i	4	8	11	17	20	24	32
f_i	3	5	9	5	4	3	1

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8. The mean of 5 observations is 4.4 and their variance is 8.24. If three of the observations are 1, 2 and 6, then the other two observations are

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Exercise 4 1 Very Short Answer Type Questions

1. Find the mean from the mean of the following discrete data 6,7, 10,1213,4,12 ,16

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2. Find the mean deviation about the mean for the following data

38,70,48,40,42,55,63,46,54,44

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3. Find the mean deviation about the median for the following data

13,17,16,11,13,10,16,11,18,12,17

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4. Find the mean deviation about the mean for the following distribution.

(i)

x_i	10	11	12	13
f_i	3	12	18	12

(ii)

x_i :	10	30	50	70	90
f_i :	4	24	28	16	8

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Exercise 4 1 Long Answer Questions

1. Find the mean deviation about the median for the following frequency distribution.

x_i	5	7	9	10	12	15
f_i	8	6	2	2	2	6

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Exercise 4 2 Very Short Answer Questions

1. Find the variance and standard deviation of the following data :

(i) 6,7,10,12,13,4,8,12

(ii) 5,12,3,18,6,8,2,10

(iii) 350,361, 370, 373, 376, 379, 385, 387, 394, 395

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2. The variance of 20 observations is 5. If each of the observations is multiplied by 2. Find the variance of the resulting observations.

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3. The coefficient of variation of two distribution are 60 and 70 and their standard deviations are 21 and 16 respectively. Find their arithmeticmeans.

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4. The arithmetic mean and standard deviation of a set of 9 items are 43 and 5 respectively. If an item of value 63 is added to that set, find the new mean and standard deviation of 10 item set given

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5. If each of the observations $x_1, x_2 \ldots x_n$ is in - creased by k. where k positive or negative number, then show that the variance remains unchanged.

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Exercise 4 2 Long Answer Questions

1. Find the variance and standard deviation of the following distribution

x_i	6	10	14	18	24	28	30
f_i	2	4	7	12	8	4	3

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2. From the prices of shares X and Y given below, for 10 days of trading, find out which share is more stable ?

x_i	35	54	52	53	56	58	52	50	51	49
y_i	108	107	105	105	106	107	104	103	104	101

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3. The scores of two cricketers A and B in 10 innings are given below. Find who is a better run getter and who is a more consistent player

Scores of $A: x_i$	40	25	19	80	38	8	67	121	66	76
Scores of $B: y_i$	28	70	31	0	14	111	66	31	25	4

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Additional Exercise Very Short Answer Questions

1. Find the mean deviation from the mean for the set of obervations 1,2,3.

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2. Find the mean deviation of the number 3,4,5,6 and 7 from their median.

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3. If the mean deviation from the median is 15 and median is 450, then find the coefficient of mean deviation.

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4. Find the mean deviation of the first three odd natural numbersfrom their mean.

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5. Find the mean deviation of first 7 natural numbers from their mean.

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6. Calculate the range and its coefficient for the following data 100, 80, 200, 150, 250, 300

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7. Find the M.D. from median of the following distribution : 3,9,2,8,1,7,7,3.

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8. Find the variance and S.D. of 3,5,7,9,11, 13 is

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9. Find the variance of first 10 multiples of 3

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10. If $n = 10, \sum_{i=1}^{10} x_i = 60$ and $\sum_{i=1}^{10} x_i^2 = 1000$ then find s.d.

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11. If the coefficient of variation of a distribution is 60 and its is s.d. is 21, then find its arithmetic mean

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12. If the variance of 1,2,3,...., 10 is 99/12, then find the standard deviation of 3,6,9,12,....30

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13. If the s.d. of -5, -4, -3, -2,-1,0,1,2,3,4,5 is $\sqrt{10}$ then find the standard deviation of 15, 16, 17,18,19,20,21,22,23,24,25

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14. If a variable x takes values 0,1,2,3,...,n with frequencies proportional to binomial coefficients $n_{C_0}, n_{C_1}, n_{C_2}, \ldots, n_{C_n}$ then show that the mean of x is $\frac{n}{2}$

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Additional Exercise Short Answer Questions

1. Suppose a population A has 100 observations 101, 102,... 20, 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 show that $\frac{V_A}{V_B} = 1$

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2. In a series of 2n observations, half of them equals to a and remaining half equals to -a. If the standard deviation of the observations is 2, then find |a|.

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3. The standard deviations of two sets containing 10 and 20 members are 2 and 3 respectively measured from their common mean 5. Find the S.D. for the whole set of 30 members.

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4. If $\sum_{i=1}^{18}(x_i-8)=9$ and $\sum_{i=1}^{18}(x_i-8)^2=45$ then find the standard deviation of $x_1, x_2, \ldots . x_{18}$

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5. Mean of 40 terms is 25 and S.D. is 4, then find the sum of the squares of all terms

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Additional Exercise Long Answer Questions

1. Find the mean deviation about mean of first 2n+1 natural numbers from mean.

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2. If the mean deviation of the numbers 1,1+d, 1+2d, 1+3d,...1+100d from their mean is 255, then find the value of d

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3. The marks obtained by 10 students are as follows. Find their mean, median and mode. Also find M.D. from mean median and mode 15,10,6,15,12,9,3,5,4,2

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4. Show that variance is independent of charge of origin but not the scale.

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5. The mean and standard deviation of 20 items is found to be 10 and 2 respectively. At the time of checking it was found that one item 8 was incorrect. If it is replaced by 12, then find the mean and variance

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6. For two data sets each of size 5 the variances are given by 4 and 5 and the corresponding means are given to be 2 and 4 respectively. Then find the variance of the combined data.

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7. The means and variance of n observations $x_1, x_2, x_3, \ldots x_n$ are 0 and 5 respectively. If $\sum_{i=1}^{n} x_i^2 = 400$, then find the value of n

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8. The standard deviation of n observations $x_1, x_2, x_3, \ldots x_n$ is 2. If $\sum_{i=1}^{n} x_i^2 = 100$ and $\sum_{i=1}^{n} x_i^2 = 20$ show the values of n are 5 or 20

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9. An analysis of monthly wages paid to the workers in two Firms. A and B belonging to the same industry gave the following results :

Particulars	Firm A	Firm B
Number of wage-earners	586	648
Average monthly wages	Rs.52.5	Rs.47.5
Variance of distribution of wages	100	121

(i) Which firm, A or B, pay out layer amount as monthly wages ?

(ii) In which firm A or B, is there greater variability in individual wages

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10. The mean and standard deviation of 10 items were found to be 17 and $\sqrt{33}$. Later it was detected that an item was tekn wrongly as 26 in place of 12. Find the correct mean and standard deviation.

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11. Means and standard deviations of the scores of an intelligence test of two classes of different sizes of 25

and 75 are $M_1 = 80$ makrs and $M_2 = 85$ marks and S.D. = 15 marks and S.D = 20 marks

Calculate the combined mean and the standard deviation of the two classes.

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Exercise I

1. If the average of the first n numbers in the sequence 148, 146, 144,....., is 125, then n =

A. 18

B. 24

C. 30

D. 36

Answer: B

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2. In a data the number I is repeated I times for i=1, 2, ...,n.

Then the mean of the data is

A. $\frac{2n+1}{6}$

B. $\frac{2n+1}{4}$

C. $\frac{2n+1}{3}$

D. $\frac{2n+1}{2}$

Answer: C

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3. The mean of 10 observations is 16.3. By an error one observations is registered as 32 instead of 23. Then the correct mean is

A. 15.6

B. 15.4

C. 15.7

D. 15.8

Answer: B

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4. 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

Answer: C

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5. The mean weight of 9 items is 15. If one more items is added to the series now the mean becomes 16. The value of 10^{th} item is

A. 35

B. 30

C. 25

D. 20

Answer: C

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6. Consider the frequency distribution of the given number

Value	1	2	3	4
Frequency	5	4	6	f

If the mean is known to be '3', then the value of f is

A. 3

B. 7

C. 10

D. 14

Answer: D

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7. Mean of the numbers 1,2,3,...,n with respective weights $1^2+1, 2^2+2, 3^2+3, \ldots, n^2+n$ is

A. $\frac{3n+2}{2}$

B. $\frac{3n+1}{4}$

C. $\frac{2n+1}{3}$

D. $\frac{3n(n+1)}{2(2n+1)}$

Answer: B

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8. The mean of n items is $\bar{x}$. If the first item is increased by 1, second by 2 and so on, then the new mean is

A. $\bar{x} + n$

B. $\bar{x} + \frac{n}{2}$

C. $\bar{x} + \frac{n+1}{2}$

D. $\bar{x} + (n+1)$

Answer: C

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9. The number of observation in a group is 40. If the average of first 10 is 4.5 and that of the remaining 30 is 3.5, then the average of the whole group is

A. $\frac{1}{5}$

B. $\frac{15}{4}$

C. 6

D. 8

Answer: B

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10. Mean of a set of numbers is $\bar{x}$. If each number is increased by λ, then the mean of new set is

A. $\bar{x}$

B. $\bar{x} + \lambda$

C. $\lambda\bar{x}$

D. λ

Answer: B

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11. The median of 5,19,14,6,8,9,12,13,21 is

A. 9

B. 13

C. 14

D. 12

Answer: D

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

A. is decreased by 2

B. is two times the original median

C. remains the same as that of the original set

D. is increased by 2

Answer: C

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13. Median of $\frac{x}{5}, x, \frac{x}{4}, \frac{x}{2}, \frac{x}{3}$ is 8. If $x > 0$ then value of x is

A. 24

B. 18

C. 27

D. 51

Answer: A

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14. The mean and median of 100 items are 50 and 52 respectively. The value of the largest item is 100. It was

later found that it is actually 110. Then the true mean and median are

A. 50.1, 52

B. 51, 52

C. 50, 52

D. 50, 51

Answer: A

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15. Mode of the data 3,2,5,2,3,6,6,5,3,5, 2, 5 is

A. 3

B. 4

C. 5

D. 6

Answer: C

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16. Mode of the following distribution is

Marks	4	5	6	7	8
No. of students	3	5	10	6	1

A. Option 1: 5

B. Option 2: 5.28

C. Option 3: 6

D. Option 4: 6.28

Answer: C

17. If the difference between mean and mode is 63, then difference between mean and median is

A. 21

B. 31.5

C. 48.5

D. 189

Answer: A

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18. If the mode of the data 25,15,20,25,18,14,15,18,16,20,25,20,x,18 is 25 then x is

A. 20

B. 25

C. 15

D. 5

Answer: B

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19. A data consists of two 2's, four 4's, six 6's three 8s', and 10. Then the mode of data is

A. 2

B. 4

C. 6

D. 8

Answer: C

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20. The average value of the median of 2,8,3,7,4,6,7 and the mode of 2,9,3,4,9,6,9 is

A. 6

B. 7.5

C. 8

D. 9m

Answer: B

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21. Geometric mean of $2, 2^2, 2^3, \ldots, 2^n$ is

A. 2

B. $2^{\frac{n}{2}}$

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

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

Answer: C

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22. If the Geometrical mean of x, 16, 50 is 20, then the value of x is

A. 40

B. 20

C. 10

D. 4

Answer: C

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23. The reciprocal of the mean of the reciprocals of n observations is

A. A.M.

B. G.M.

C. H.M.

D. Median

Answer: C

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24. The Harmonic mean of the numbers 2,3,4 is

A. $3\sqrt{24}$

B. 3

C. $\frac{13}{36}$

D. $\frac{36}{13}$

Answer: D

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25. If A.M. = 24.5, G.M. 24.375 then H.M. =

A. 24

B. 24.125

C. 24.5

D. 24.25

Answer: D

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26. In problems on speed of a body, the average used is

A. A.M.

B. G.M.

C. H.M.

D. Median

Answer: C

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27. The H.M. of the numbers 1/5, 1/10, 1/15, 1/20, 1/25, 1/30, 1/35 is

A. $1/20$

B. $1/16$

C. $1/15$

D. $1/13$

Answer: A

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28. A man travels at a speed of 20 Km/hr. and then returns at a speed of 30 Km/hr. His average speed of whole journey is

A. 25 km/hr

B. 24.5 km/hr

C. 24 km/hr

D. 25.5 km/hr

Answer: C

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29. The mean deviation from the mean for the set of observation -1, 0, 4 is

A. $\frac{2}{3}$

B. 1

C. 2

D. $\sqrt{\frac{14}{3}}$

Answer: C

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30. Mean deviation from the mean for data 6, 7 10, 12, 13, 4, 8, 12 is

A. 2.35

B. 2.75

C. 3.35

D. 3.75

Answer: B

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31. The mean deviation of the number 3, 4, 5, 6, 7 from median is

A. 0

B. 1.2

C. 5

D. 25

Answer: B

32. If mean deviation through median is 15 and median is 450, then coefficient of mean deviation is

A. $1/30$

B. 30

C. 15

D. 45

Answer: A

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33. In a moderated asymmetrical distribution S.D. is 20 then the mean deviation is

A. $20/3$

B. 16

C. 40

D. 20

Answer: B

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

A. $\frac{7}{2}, \sqrt{\frac{35}{12}}$

B. 3,3

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

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

Answer: A

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35. For a series the information available is $n = 10 \sum x = 60, \sum x^2 = 1000.$ The standard deviation is

A. 8

B. 64

C. 24

D. 128

Answer: A

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36. Coefficient of variation of a distribution is 60 and its standard deviation is 21, then its arithmetic mean is

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37. If the mean of 10 observations is 50 and the sum of the squares of the deviations of the observations from the mean is 250, then the coefficient of variation of those observations is

A. 25

B. 50

C. 10

D. 5

Answer: C

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38. Standard deviation of first 'n' natural numbers is

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

B. $\sqrt{\frac{n(n+1)}{2}}$

C. $\sqrt{\frac{n^2-1}{12}}$

D. n

Answer: C

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39. The variance of the first 50 even natural numbers is

A. $833/4$

B. 833

C. 437

D. $437/4$

Answer: B

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40. The median and S.D. of a distribution are 20 and 4 respetively. If eahc item is increased by 2, the new median and S.D. are

A. 20, 6

B. 22, 6

C. 18, 6

D. 22, 4

Answer: D

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41. The standard deviation of 26, 27, 31, 32, 35 is

A. 0

B. $\sqrt{\frac{16}{5}}$

C. $\sqrt{\frac{274}{25}}$

D. $\sqrt{\frac{58}{5}}$

Answer: C

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42. The standard deviation of a, a+d, a + 2d,....a + 2nd is

A. nd

B. $n^2 d$

C. $\sqrt{\frac{n(n+1)}{3}}d$

D. $\sqrt{\frac{n(n+3)}{3}}d$

Answer: C

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43. The variance of first 10 multiples of 3 is

A. 64.25

B. 54.25

C. 70.25

D. 74.25

Answer: D

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44. For a group of 50 male workers, the mean and S.D. of their daily wages are Rs. 630 and Rs. 90 respectively. For a group of 40 female workers, these are Rs. 540 and Rs. 60 respectively. The S.D. of these 90 workers is

A. 60

B. 70

C. 80

D. 90

Answer: D

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45. If standard deviation of 1,2,3,4,....,10 is σ then standard deviation of 11, 12, ...20 is

A. $\sigma + 10$

B. 10σ

C. σ

D. 5σ

Answer: C

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46. The standard deviation of a variable x is σ. The standard deviation of the variable $\frac{ax+b}{c}$ where a, b, c

are constants is

A. $\left(\frac{a}{c}\right)\sigma$

B. $\left|\frac{a}{c}\right|\sigma$

C. $\left|\frac{a^2}{c^2}\right|\sigma$

D. σ

Answer: B

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47. The variance of observation $x_1, x_2, x_3, \ldots, x_n$ is σ^2 then the variance of

$\alpha x_1, \alpha x_2, \alpha x_3, \ldots, \alpha x_n, (\alpha \neq 0)$ is

A. σ^2

B. $\alpha\sigma^2$

C. $\alpha^2\sigma^2$

D. $\frac{\sigma^2}{\alpha^2}$

Answer: C

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48. The standard deviations of two sets containing 10 and 20 members are 2 and 3 respectively measured from their common means 5. The S.D. for the whole set of 30 members is

A. $\frac{2}{\sqrt{3}}$

B. $\sqrt{6}$

C. $\sqrt{\left(\frac{22}{3}\right)}$

D. $\sqrt{3}$

Answer: C

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49. The standard deviation of the observations 22, 26, 28, 20, 24, 30 is

A. 2

B. 2.4

C. 3

D. 3.42

Answer: D

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50. 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 & 9

B. 3 & 9

C. 4 & 7

D. 5 & 6

Answer: C

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51. Which of the following is correct relations a symmetrical distribution is

A. $A.M. - M_o = 3(A.M. - M_d)$

B. $A.M. - M_o = 2(A.M. - M_d)$

C. $M_d = 2A.M. - 3M_d$

D. $A.M. + M_o = 3(A.M. - M_d)$

Answer: A

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52. One of the methods of determining mode is

A. mode = 2 median - 3 mean

B. mode = 2 median + 3 mean

C. mode = 2 median - 2 mean

D. mode = 3 median + 3 mean

Answer: C

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53. Which of the following is correct for data -1, 0, 1,2,3,5,5,6,8,10,11

A. mean = mode = median

B. mean = 5

C. mean = mode

D. mode = median

Answer: D

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54. If m is mean of distribution, then $\sum (x_i - m)$ is equal to

A. mean deviation

B. standard deviation

C. 0

D. -2

Answer: C

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55. Consider the following statements :

(i) Mode can be computed from histogram.

(ii) Median is not independent of change of scale.

(iii) Variance is independence of change of origin and

scale.

Which of these is/are correct :

A. only (i)

B. only (ii)

C. only (i) and (ii)

D. (i), (ii) and (iii)

Answer: C

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56. Match the correct parts to make a valid statement

List - I	List - II
A) Arithmetic Mean	1) $l+[f_2/(f_1+f_2)]\times i$
B) Geometric Mean	2) $(x_1 \cdot x_2 \cdot \ldots\ldots \cdot x_n)^{1/n}$
C) Harmonic Mean	3) $\sum fX / \sum f$
D) Median	4) $l+\frac{N/2-c\cdot f}{f}\times i$
E) Mode	5) $\left[\frac{1}{n}\left(\frac{1}{x_1}+\frac{1}{x_2}+\ldots\ldots+\frac{1}{x_n}\right)\right]^{-1}$
	6) $l+\frac{f_1-f_0}{2f_1-f_0-f_2}\times i$

The correct match from List - I from List - II

A. A-3,B-5,C-4,D-1,E-2

B. A-2,B-4,C-1,D-5,E-3

C. A-3,B-2,C-5,D-4,E-6

D. A-1,B-3,C-2,D-4,E-6

Answer: C

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57. i. Mean = a (3 median - mode)

II. Mean - Mode = b(Mean - Median)

(iii) Median = Mode + c (Mean - mode)

A. $a < c < b$

B. $a < b < c$

C. $b < c < a$

D. $c < a < b$

Answer: A

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58. Observe the following statements :

(A) : The median of 100 items is 52. The value of the largest item is 100. It was later found that it actually 110. Therefore the true median is 52.

(R) : The median is not effected by the extreme observations.

A. both A, R are true and $R \Rightarrow A$

B. both A, R are true and $R \not\Rightarrow A$

C. A is true, R is false

D. A is false, R is true

Answer: A

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59. Two teams A and B have the same mean and their coefficients of variance are 4, 2 respectively. If σ_A, σ_B are the standard deviations of teams A, B respectively then the relation between item is

A. $\sigma_A = \sigma_B$

B. $\sigma_B = \sigma_{2A}$

C. $\sigma_A = 2\sigma_B$

D. $\sigma_B = 4\sigma_A$

Answer: C

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Exercise Ii

1. If a variable takes the values 0, 1, 2,...,n with frequencies proporiotnal to binomial coefficient $n_{C_0}, n_{C_1}, n_{C_2}, \ldots . n_{C_n}$, then mean of distribution is

A. $\frac{2^n}{n+1}$

B. $\frac{2^{n+1}}{n(n+1)}$

C. $\frac{n+1}{2}$

D. $\frac{n}{2}$

Answer: D

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2. If a variable takes values 0, 1, 2,...,n with frequencies $q^n, \frac{n}{1}q^{n-1}p, \frac{n(n-1)}{1.2}q^{n-2}p^2, \ldots, p^n$ where p+q = 1, then the mean is

A. pq

B. np

C. nq

D. np^2

Answer: B

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

A. 73

B. 65

C. 68

D. 74

Answer: B

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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

A. 40

B. 20

C. 80

D. 60

Answer: C

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5. A student has obtained 75%, 80% and 855 in three subjects. If the marks of another subject are added then his average can not be less than

A. 0.6

B. 0.65

C. 0.8

D. 0.9

Answer: A

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6. If $\bar{x}_1$ and $\bar{x}_2$ are the means of two distribution such that $\overline{x_1} < \overline{x_2}, \bar{x}$ is mean of the combined distribution then

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

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

C. $\bar{x} = \dfrac{\bar{x}_1 + \bar{x}_2}{2}$

D. $\bar{x}_1 < \bar{x} < \bar{x}_2$

Answer: D

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7. A distribution consists of three components with frequencies 300, 200 and 600 having their means 16, 8 and 4 respectively, then the mean of combined distribution is

A. 11

B. 10

C. 9

D. 8

Answer: D

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8. The mean marks got by 300 students in the subject of statistics was 45. The mean of the top 100 of them was found to be 70 and the mean of the last 100 was known to be 20, then the mean of the remaining 100 students is

A. 45

B. 58

C. 68

D. 88

Answer: A

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9. The minimum value $(x-6)^2+(x+3)^2+(x-8)^2+(x+4)^2+(x-3)^2$ is

A. 114

B. 141

C. 104

D. 2

Answer: A

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10. If a variable takes the discrete values $\alpha+4, \alpha-\frac{7}{2}, \alpha-\frac{5}{2}, \alpha-3, \alpha-2, \alpha+\frac{1}{2}, \alpha-\frac{1}{2}, \alpha+5$ where $(\alpha>0)$ then the Median is

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

B. $\alpha-2$

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

D. $\alpha+\frac{1}{2}$

Answer: C

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11. The minimum value $|x-6|+|x+3|+|x-8|+|x-4|+|x-3|$ is

A. 11

B. 21

C. 31

D. 42

Answer: B

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

A. 24.0

B. 25.5

C. 20.5

D. 22.0

Answer: A

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13. The starting value of the model class of a distribution is 20. The frequency of the model class is 18. The frequencies of the classes preceeding and succeeding are 8,10 and the width of the model class is 5, then mode is

A. 18.5

B. 20.5

C. 21.4

D. 22.78

Answer: D

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14. If $M_{g,x}$ is the geometric mean of N x's and $M_{g,y}$ is the geometric mean of N y's, then the grometric mean M_g of the 2N values is

A. $N\sqrt{M_{g,x}M_{g,y}}$

B. $\sqrt{M_{g,x}M_{g,y}}$

C. $\left(M_{g,x}M_{g,y}\right)$

D. $\left(M_{g,x}M_{g,y}\right)^2$

Answer: B

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15. If the Arithmetic mean and Geometrical mean of three numbers are equal to x, then the each number is equal to

A. x

B. 2x

C. $\sqrt{x}$

D. $3\sqrt{x}$

Answer: A

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16. A car completes the first half of its journey with a velocity V_1 and the remaining half with a velocity V_2. Then the average velocity of the car for the whole journey is

A. $\frac{V_1 + V_2}{2}$

B. $\sqrt{V_1 + V_2}$

C. $\frac{2V_1V_2}{V_1 + V_2}$

D. $\frac{1}{V_1} + \frac{1}{V_2}$

Answer: C

View Text Solution

17. An automobile driver travels from plane to a hill station 120 Km distant at an average speed of 30 km per hour. He then makes the return trip at an average speed of 25 km per hour. He covers another 120 km distance on plane at an average speed of 50 km per hour. His average speed over the distance of 360 km will be

A. $\frac{30 + 25 + 50}{3}$ km/hr

B. $(30.35.50)^{1/3}$ km/hr

C. $\frac{3}{\frac{1}{30}+\frac{1}{25}+\frac{1}{50}}$ km/hr

D. 105 km/hr

Answer: C

View Text Solution

18. A cyclist covers his first three miles at an average speed of 8 m.p.h. Anoter two miles at 3m.p.h. and the last two miles at 2m.p.h. The average speed for the entire journey is : (in m.p.h)

A. 3

B. 2.4

C. 3.8

D. 3.43

Answer: D

View Text Solution

19. If the mean deviation of the number 1, 1+d, 1+2d,....,1+100 d from their means is 255, then the d is equal to

A. 20.0

B. 10.1

C. 20.2

D. 10.0

Answer: B

View Text Solution

20. The sum of 10 items is 12 and sum of their squares is 18, then standard deviaiton is

A. $\frac{1}{5}$

B. $\frac{2}{5}$

C. $\frac{3}{5}$

D. $\frac{4}{5}$

Answer: C

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21. In a series of 2n observatiobs, half of them equal to a and remaining half equals to -a. If the standard deviation of the observations is 2, then |a| equals to

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

B. $\sqrt{2}$

C. 2

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

Answer: C

View Text Solution

22. If $\sum_{i=1}^{18}(x_i - 8) = 9$ and $\sum_{i=1}^{18}(x_i - 8)^2 = 45$ then the standard deviation of $x_1, x_2, \ldots, x_{18}$ is

A. $\frac{4}{9}$

B. $\frac{9}{4}$

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

D. $\frac{1}{2}$

Answer: C

View Text Solution

23. Mean of 40 terms is 25 and S.D. is 4, then find the sum of the squares of all terms

A. 25640

B. 25000

C. 25645

D. 35645

Answer: A

View Text Solution

24. Let $x_1, x_2, \ldots, x_n$ be n observations such that $\sum x_i^2 = 400$ and $\sum x_i = 80$. Then a possible value of n among the following is

A. 15

B. 18

C. 9

D. 12

Answer: B

View Text Solution

25. In an experiment with 15 observations on a, the following results were available $\sum x^2 = 2830, \sum x = 170$. One observation that was 20 was found to be wrong and was replaced by the correct value 30. Then the corrected variance is

A. 8.33

B. 78.00

C. 188.66

D. 177.33

Answer: B

View Text Solution

26. If a variable takes the values 0, 1, 2,...,n with frequencies proporiotnal to binomial coefficient $n_{C_0}, n_{C_1}, n_{C_2}, \ldots . n_{C_n}$, then mean of distribution is

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

B. $\frac{n}{2}$

C. $\frac{n}{4}$

D. $\frac{n}{3}$

Answer: C

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27. Suppose a population A has 100 observations 101, 102,... 20, 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 show that $\frac{V_A}{V_B} = 1$

A. $\frac{9}{4}$

B. $\frac{4}{9}$

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

D. 1

Answer: D

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28. The marks of some students were listed out of 75. The S.D. marks was found to be 9. Subsequently the marks were raised to a maximum of 100 and variance of new marks was calculated. The new variance is

A. 144

B. 122

C. 81

D. 75

Answer: A

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29. Statement - I : The variance of first n even natural numbers is $\frac{n^2-1}{4}$

Statement - II : The sum of first n natural numbers is $\frac{n(n+1)}{2}$ and the sum of the squares of first n natural numbers is $\frac{n(n+1)(2n+1)}{6}$

A. Statement-I is true, Statement-II is true, Statement - II is not a correct explanation for statement - I

B. Statement-I is true, Statement-II is false

C. Statement-I is false, Statement-II is true

D. Statement-I is true, Statement-II is true, Statement - II is a correct explanation for statement - I

Answer: C

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30. All the students of a class performed poorly in Mathematics. The teacher decided to give grace marks of 10 to each of the students. Which of the following statistical measures will not change even after the grace marks were given ?

A. mean

B. median

C. mode

D. variance

Answer: D

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31. The arithmetic mean of the observation 10,8,5,a,b is 6 and their variance is 6.8. Then ab =

A. 6

B. 4

C. 3

D. 12

Answer: D

View Text Solution

32. If the median of the data 6,7,x-2,18,21 written in ascending order is 16, then the variance of that data is

A. $30\frac{1}{5}$

B. $31\frac{1}{3}$

C. $32\frac{1}{2}$

D. $33\frac{1}{3}$

Answer: B

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Practice Exercise

1. The mean of marks obtained in an examination by a group of 100 students was found to be 49.96. The mean of the marks obtained in the same examination by another group of 200 students was 52.32, then the mean of the marks obtained by both the groups of students taken together is

A. 51.5

B. 52

C. 52.5

D. 53

Answer: A

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2. If 5 is added to each and every item of a data, then the A.M. is

A. 5 times to the first A.M.

B. increased by 5 to the first A.M.

C. equal to the first A.M.

D. decreased by 5 to the first A.M.

Answer: B

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3. If 6,5,8 and 3 occur with frequencies 4,2,5 and 1 respectively, then the arithmetic mean is

A. 6.15

B. 6.35

C. 6.25

D. 6.45

Answer: C

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4. The mean of 20 observations is 15. On Checking it was found that two observations were wrongly copied as 3 3 and 6. If wrong observations are replaced by correct values 8 and 4, then the correct means is

A. 15

B. 15.15

C. 16.15

D. 17

Answer: B

View Text Solution

5. Mean of 100 observation is 45. It was later found that two observations 19 and 31 were incorrectly recorded as 91 and 13. Then the correct means is

A. 44.0

B. 44.46

C. 45.00

D. 45.54

Answer: B

View Text Solution

6. Mean of 10 numbers is 6. It was later observed that one number was misread as 9. When the correct means was 7, then the correct value of that number is

A. 19

B. 20

C. 8

D. 10

Answer: A

View Text Solution

7. A group of 10 items has mean 6. If the mean of 4 of these items is 7.5, then the mean of the remaining items is

A. 6.5

B. 5.5

C. 4.5

D. 5.0

Answer: D

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8. The mean weight of 150 students in a certain class is 60 kilograms. The mean weight of boys in the class is 70 kilograms and that of the girls is 55 kilograms, then the number of boys and girls are

A. 100,50

B. 50100

C. 75,75

D. 60, 90

Answer: B

View Text Solution

9. The mean age of a combined group of men and women is 30 years. If the means of the age of men and women are respectively 32 and 27, then the percentage of women in the group is

A. 30

B. 40

C. 50

D. 60

Answer: B

View Text Solution

10. The mean of a set observations is $\bar{x}$. If each observation if divided by $\alpha(\neq 0)$ and it is increased by 10, then the mean of the new set is

A. $\frac{\bar{x}}{\alpha}$

B. $\frac{\bar{x}+10}{\alpha}$

C. $\frac{\bar{x}+10\alpha}{\alpha}$

D. $\alpha\bar{x}+10$

Answer: C

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11. If the mean of a set of observations $x_1, x_2, \ldots, x_{10}$ is 20 then the mean of $x_1 + 4, x_2 + 8, x_3 + 12, \ldots, x_{10} + 40$ is

A. 34

B. 42

C. 38

D. 40

Answer: B

View Text Solution

12. The A.M. of the series

$.^{n}C_{0}, .^{n}C_{1}, .^{n}C_{2}, \ldots., .^{n}C_{n}$ is

A. $\frac{2^{n}}{n+1}$

B. $\frac{2^{n}}{n}$

C. $\frac{2^{n-1}}{n+1}$

D. $\frac{1}{n+1}$

Answer: A

Watch Video Solution

13. The mean of first three items is 14 and mean of next two items is 18. The mean of all the five terms is :

A. 14.5

B. 15.0

C. 15.2

D. 15.6

Answer: D

Watch Video Solution

14. Six faces of a balanced die are numbered from integers 1 to 6. This die is tossed 60 times and the frequency distriction of the integers obtained is given below. Then the mean of the grouped data is

Integer	1	2	3	4	5	6
Frequency	8	9	10	16	9	8

A. 3.25

B. 3.55

C. 3.45

D. 3.35

Answer: B

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15. The A.M. of set of 50 numbers is 38. If two numbers of the set, namely 55 and 45 are discarded, the A.M. of the remaining set of number is

A. 38.5

B. 37.5

C. 36.5

D. 36.0

Answer: B

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16. The simple and weighted arithmetic mean of the first n natural numbers, the weights being the corresponding numbers is

A. $\frac{n+1}{2}, \frac{2n+1}{2}$

B. $\frac{n+1}{2}, \frac{2n+1}{4}$

C. $\frac{n+1}{2}, \frac{2n+1}{3}$

D. n, n^2

Answer: C

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17. The average salary of male employees in a firm was RS. 520 and that of females was Rs. 420. The mean salary of all the employees was Rs. 500. The percentage of male and female employees are

A. 30, 70

B. 80, 20

C. 40, 60

D. 50, 50

Answer: B

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18. The median of 25, 14, 11, 26, 18 , 17, 40, 29, 19, 20, 13 is

A. 17

B. 12

C. 29

D. 19

Answer: D

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19. The median of 111, 129, 143, 118, 120, 125, 170, 162 is

A. 127

B. 118

C. 111

D. 135

Answer: A

Watch Video Solution

20. The median of the following items 25,15,23,40,27,25,23,25 and 20 is

A. 27

B. 40

C. 25

D. 23

Answer: C

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21. The test marks in statistic for a class are 20,24,27,38,18,42,35,21,44,18,31,36,41,26,29. The median

score of the class is

A. 8

B. 21

C. 29

D. 31

Answer: C

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22. The mean of two samples of sizes 200 and 300 were found to be 25, 10 respectively. Their standard deviations were 3 and 4 respectively. The variance of combined sample of size 500 is

A. 64

B. 65.2

C. 67.2

D. 64.2

Answer: C

View Text Solution

23. The median of a series is 10. Two additional observations 7 and 20 are added to series. The median of new series is

A. 9

B. 20

C. 7

D. 10

Answer: D

Watch Video Solution

24. The mean and standard deviation of 20 items is found to be 10 and 2 respectively. At the time of checking it was found that one item 8 was incorrect. If it is replaced by 12, then find the mean and variance

A. 10.2, 4.01

B. 10.1, 3.69

C. 10.2, 3.96

D. 10.2, 3.76

Answer: C

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25. If in a moderately skewed distribution, the values of mode and mean are 6λ and 9λ respectively, then value of median is

A. 8λ

B. 6λ

C. 7λ

D. 5λ

Answer: A

View Text Solution

26. The mode of a set of observation 7, 12,8,5,6,4,9,10,8,9,7,6,5,9 is

A. 7

B. 8

C. 9

D. 12

Answer: C

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27. The mode of 3,3,7,4,5,3,5,6,8,9,5,3,5,3,6,9,7 ,4 is

A. 4

B. 7

C. 3

D. 5

Answer: C

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28. For data 4,5,5,7,6,6,3,2,5,7,6,7 the number of modes is

A. 3

B. 2

C. 1

D. 12

Answer: A

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29. Mode of 12,14,11,16,15,14,11,13,14 is

A. 14

B. 11

C. 15

D. 12

Answer: A

Watch Video Solution

30. In a moderately skewed distribution, the values of mean and median are 5 and 6 respectively. The value of mode for such distribution is

A. 8

B. 11

C. 16

D. 12

Answer: A

31. The geometric mean of observation 2,4,16 and 32 is

A. 6

B. 7

C. 8

D. 9

Answer: C

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32. The geometric mean of 5,8,10,15,20,25,30,35 is

A. 16.9

B. $10(9)^{1/7}$

C. 18

D. $10\left(\frac{63}{2}\right)^{1/8}$

Answer: D

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33. The men deviation of first 7 natural numbers from mean is

A. $7/2$

B. $3/2$

C. $12/7$

D. $7/12$

Answer: C

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34. Mean deviation of first three odd numbers from mean is

A. 3

B. 2

C. 1

D. $4/3$

Answer: D

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35. Mean deviation of 39,40,41,41,42,42,43,43,44,44, 45 through median is

A. 15

B. 1.5

C. 43

D. 35

Answer: B

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36. Mean deviation from median of the data 90,100,125,115, 110 is

A. 10

B. 20

C. 30

D. 40

Answer: A

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37. The mean deviation from mean of the data 90,100,125,115,110 is

A. 10

B. 10.4

C. 10.6

D. 10.8

Answer: B

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38. The standard deviation of 7 scores 1,2,3,4,5,6,7 is

A. 4

B. 2

C. $\sqrt{7}$

D. 3

Answer: B

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39. The standard deviation of 15 items is 6 and each item is decreased by 1. Then the standard deviation of new

data is

A. 5

B. 7

C. $\frac{91}{15}$

D. 6

Answer: B

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40. The standard deviation for the set of the numbers 1,4,5,7,8 is 2.45. If 10 is added to each number then new standard deviation is

A. 2.45

B. 24.5

C. 0.245

D. 12.45

Answer: A

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41. Standard deviation of 5,8,11,9,11 is

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42. If the standard deviation of $x_1, x_2, \ldots, x_n$ is 3.5 then the standard deviation of $-2x_1 - 3, -2x_2 - 3, \ldots, -2x_n - 3$ is

A. -7

B. -4

C. 7

D. 1.75

Answer: C

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43. If the standard deviation of 0,1,2,3,4,5,6,7,8,9 is K, then the standard deviation of 10,11,12,....,19 is

A. K

B. K +10

C. $K + \sqrt{10}$

D. 10 K

Answer: A

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44. The variance of first 20 - natural numbers is

A. $\frac{399}{4}$

B. $\frac{379}{12}$

C. $\frac{133}{2}$

D. $\frac{133}{4}$

Answer: D

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45. The variance of 6,8,10,12,14,16,18,20,22,24 is

A. 33

B. 37

C. 45

D. 54

Answer: A

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46. Observe the following statements :

(A) : 10 is the mean of a set of 7 obervations and 5 is the mean of a set of 3 observations. The mean of a combined set is 9.

(R) : If $\bar{x}_i(i = 1, 2, \ldots, k)$ are the means of k - series $n_i(I = 1, 2, 3, \ldots, k)$ respectively, then the combined or composite mean is

$$\bar{x} = \frac{n_1\bar{x}_1 + n_2\bar{x}_2 + \ldots + n_k\overline{x_k}}{n_1 + n_2 + \ldots + n_k}$$

A. both A, R are true and $R \Rightarrow A$

B. both A, R are true and $R \not\Rightarrow A$

C. A is true, R is false

D. A is false, R is true

Answer: D

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47. A man motors from A to B. A large part of the distace is uphill and he gets a mileage of only 10 miles per gallon of gasoline. ON the return trip, he makes 15 miles per gallon, then the average of his mileage (assuming that the distance from A to B is 60 miles) is

A. 12

B. 11

C. 10

D. 20

Answer: A

48. An aeroplane files around a square, the sides of which measure 100 miles each. The aeroplane covers at a speed of 100 mph the first side, at 200 mph the second side, at 300 mph the third side and 400 mph the fourth side. The average speed of the aeroplane around the square is

A. 190 mph

B. 195 mph

C. 192 mph

D. 200 mph

Answer: C

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49. The mean of a data set consisting of 20 observation is 40. If one observation 53 was wrongly recorded as 33, then the correct mean will be

A. $\left(\frac{(16.2)^9 \times 21.9}{12.9}\right)^{1/10}$

B. $\left(\frac{(16.2)^{10} \times 21.9}{12.9}\right)^{1/10}$

C. $\left(\frac{(16.2)^{10} \times 12.9}{21.9}\right)^{1/10}$

D. $\left(\frac{(16.2)^{11} \times 21.9}{21.9}\right)^{1/11}$

Answer: B

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50. Mean of 100 observations is 50 and S.D. is 10. If 5 subtracted from each observation and then it is divided by 4, then the new mean and S.D. are

A. 11.25, 6.25

B. 11.25, 2.5

C. 11.25, 10

D. 11.35, 3.5

Answer: B

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51. Consider the following statements :

(i) Mean of 100 observations is 50 and standard deviation is 10. If 5 is added to each observation the new mean and standard deviation are 55, 10.

(ii) Mean of 100 observations is 50 and standard deviation is 10. If each observation is multiplied by 3 then the new mean and standard deviation are 50, 10/3.

The true statements are :

A. only (i)

B. only (ii)

C. both (i), (ii)

D. neither (i) nor (ii)

Answer: A

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52. I. The geometric mean of 2,4,16 and 32 is a

II. The strength of 7 colleges in a city are 385, 1748, 1343, 1935, 786, 2874 , 2108. Then the median strength is b.

II. The algebric sum of the deviations of 20 observations

measured from 30 is 2. The mean of these observations is c.

A. $a < b < c$

B. $b < c < a$

C. $c < a < b$

D. $a < c < b$

Answer: D

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53. If the mean deviation of number 1,1+d,...1+100d from their mean is 255, then a value of d is

A. 10.1

B. 5.05

C. 20.2

D. 10

Answer: A

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54. The mean of 5 observations is 5 and their variance is 124. If three of the observations are 1,2 and 6, then the mean deviation from the mean of the data is

A. 2.5

B. 2.6

C. 2.8

D. 2.4

Answer: C

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