MATHS

NCERT - NCERT MATHEMATICS(HINGLISH)

STATISTICS

Miscellaneous Exercise

1. Given that $\bar{x}$is the mean and $\sigma^2$is the variance of n observations $x_1 x_2$, ..., x_n. Prove that the mean and variance of the observations ax_1, ax_2, ax_3, ..., $ax_n$are $a\bar{x}$and $a^2\sigma^2$,

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2. The mean and standard deviation of 20 observations are found to be 10 and 2, respectively. One rechecking, it was found that an observation 8

was incorrect. Calculate the correct mean and standard deviation in each of the following cases. (i) If wrong item is omitted (ii) If it is replaced by 12.

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3. The mean and standard deviation of marks obtained by 50 students of a class in three subject, Mathematics, Physics and Chemistry are given below :

Subject	Mathematics	Physics	Chemistry
Mean	42	32	40.9
Standard deviation	12	15	20

Which of the three subjects shows the highest variability in marks and which shows the lowest?

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4. The mean and standard deviation of a group of 100 observations were found to be 20 and 3, respectively. Later on it was found that three observations were incorrect, which are recorded as $21, 21$ and 18. Find the mean and standard deviation if the incorrect observations are omitted.

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5. The mean and variance of 7 observations are 8 and 16, respectively. If five of the observations are $2, 4, 10, 12, 14$. Find the remaining two observations.

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6. The mean and variance of eight observations are 9 and 9.25, respectively. If six of the observations are 6, 7, 10, 12, 12 and 13, find the remaining two observations.

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7. The mean and standard deviation of six observations are 8 and 4, respectively. If each observation is multiplied by 3, find the new mean and new standard deviation of the resulting observations.

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Solved Examples

1. Calculate mean, Variance and Standard Deviation for the following distribution.

Classes	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

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2. Two plants A and B of a factory show following results about the number of workers and the wages paid to them.

	A	B
No. of workers	5000	6000
Average monthly wages	Rs 2500	Rs 2500
Variance of distribution of wages	81	100

In which plant, A or B is there greater variability in individual wages?

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3. Calculate the mean, variance and standard deviation for the following distribution :

Class interval	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90	90 – 100
Frequency	3	7	12	15	8	3	2

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4. Find the standard deviation for the following data :

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5. The variance of 20 observations is 5. If each observation is multiplied by 2, find the new variance of the resulting observations.

A. 20

B. 30

C. 40

D. 50

Answer: A

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

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7. Coefficient of variation of two distributions are 60 and 70, and their standard deviations are 21 and 16, respectively. What are their arithmetic means.

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8. The following values are calculated in respect of heights and weights of the students of a section of Class XI

	Height	Weight
Mean	162.6 cm	52.36 kg
Variance	127.69 cm^2	23.1361 kg^2

:

Can we say that the weights show greater variation than the

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9. If each of the observation $x_1, x_2, \ldots\ldots, x_n$ is increased by a where a is a negative or positive number, show that the variance remains unchanged.

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10. The mean and standard deviation of 100 observations were calculated as 40 and 5.1, respectively by a student who took by mistake 50 instead of 40 for one observation. What are the correct mean and standard deviation?

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11. 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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12. Find the Variance of the following data:

6, 8, 10, 12, 14, 16, 18, 20, 22, 24

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13. Find the mean deviation about the median for the following data:

x_i	3	6	9	12	13	15	21	22
f_i	3	4	5	2	4	5	4	3

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14. Find mean deviation about the mean for the following data :x_i 2 5 6 8 10 12 f_i 2 8 10 7 8 5

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15. Calculate the mean deviation about median for the following data :

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	6	7	15	16	4	2

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16. 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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17. Find the mean deviation about the mean for the following data:

6, 7, 10, 12, 13, 4, 8, 12

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18. Find the mean deviation about the median for the following data:

3, 9, 5, 3, 12, 10, 18, 4, 7, 19, 21.

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Exercise 15 1

1. Find the mean deviation about the mean for the data :x_i 10 30 50 70 90

f_i 4 24 28 16 8

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2. Find the mean deviation about the median for the data : x_i: 5 7 9 10 12 15. f_i: 8 6 2 2 6

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3. Find the mean deviation about the median for the data : $36, 72, 46, 42, 60, 45, 53, 46, 51, 49$

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4. Find the mean deviation about the mean for the data :

x_i	5	10	15	20	25
f_i	7	4	6	3	5

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5. Find the mean deviation about the mean for the data :

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

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6. Find the mean deviation about the median for the data :

13, 17, 16, 14, 11, 13, 10, 16, 11, 18, 12, 17

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7. Find the mean deviation about the mean for the data : $4, 7, 8, 9, 10, 12, 13, 17$

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8. Find the mean deviation about the median for the data : x_i 15 21 27 30 35 f_i 3 5 6 7 8

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9. Find the mean deviation about the mean for the data : Income 0-100 100-200 200-300 300-400 400-500 500-600 600-700 700-800per dayNumber 4 8 9 10 7 5 4 3of persons

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

Marks	0-10	10-20	20-30	30-40	40-50	50-60
Number of Girls	6	8	14	16	4	2

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11. Find the mean deviation about the mean for the data :

Height	$95-105$	$105-115$	$115-125$	$125-135$	$135-$
Number of Boys	9	13	26	30	12

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12. Calculate the mean deviation about median age for the age distribution of 100 persons given below:Age 16-20 21-25 26-30 31-35 36-40 41-45 46-50 51-55Number 5 6 12 14 26 12 16 9

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Exercise 15 3

1. The following is ht record of goals scored by team A in a football session

No. of goals scored	0	1	2	3	4
No. of matches	1	9	7	5	3

For the team b, mean number of goals scored per match was 2 with a standard deviation 1.25 goals. Find which team may be considered more consistent?

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2. The sum and sum of squares corresponding to length x (in cm) and weight y (in gm) of 50 plant products are given below $\sum_{i=1}^{50} x_i = 212, \sum_{i=1}^{50} x_i^2 = 902.8, \sum_{i=1}^{50} y_1 = 261, \sum_{i=1}^{50} y_i^2 = 1457.6$Which is more varying the length or weight?

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3. For the data given below state which group is more variable, A or B?

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Group A	9	17	32	33	40	10	9
Group B	10	20	30	25	43	15	7

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4. From the prices of shares X and Y below, find out which is more stable in value

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5. An analysis of monthly wages paid to workers in two firms A and B, belonging to the same industry, gives the following result

	Firm A	Firm B
No.of wage earners	586	648
Mean of monthly wages	Rs 5253	Rs 5253
Variance of the distribution of wages	100	121

(i) Which firm A or B pays larger amount as monthly wages?

(ii) Which firm, A or B, show greater variability in individual wages?

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Exercise 15 2

1. Find the mean and variance for the following frequency distributions :

Classes	0-30	30-60	60-90	90-120	120-150	150-180	180-210
Frequencies	2	3	5	10	3	5	2

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2. Find the mean and standard deviation using short-cut method.

x_i	60	61	62	63	64	65	66	67	68
f_i	2	1	12	29	25	12	10	4	5

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3. Find the mean and variance for each of the data :

x_i	92	93	97	98	102	104	109
f_i	3	2	3	2	6	3	3

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4. Find the mean and variance for each of the data :

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

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5. Find the mean and variance for each of the data :

First 10 multiples of 3.

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6. Find the mean and variance for each of the data :

First n natural numbers

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7. Find the mean and variance for each of the data :

6, 7, 10, 12, 13, 4, 8, 12

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8. Find the mean, variance and standard deviation using short-cut method

Height in cms	70-75	75-80	80-85	85-90	90-95	95-100	100-105	105-110	110-115
No. of children	3	4	7	7	15	9	6	6	3

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9. Find the mean and variance for the following frequency distributions :

Classes	0-10	10-20	20-30	30-40	40-50
Frequencies	5	8	15	16	6

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10. The diameters of circle (in mm) drawn in a design are given below:

Diameters	33-36	37-40	41-44	45-48	49-52
No. of circles	15	17	21	22	25

Calculate the SD and mean

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