Aims Public School

Chapter No. 22
Basic Statistics

EX: 22.5:

1. Find range, variance, mean deviation and standard deviation of number of absentees in a class for last seven days: 3, 5, 3, 2, 4, 1, 8.

For Range:

$\therefore Range = R = x_{(largest \quad value)} - x_{(\text{smallest} \quad value)}$

$(Values \quad given \quad in \quad data = 3, 2, 3, 2, 4, 1, 8)$

$R = 8 - 1 = 7$

For A.M:

$$\therefore \bar{x} = \frac{\sum x}{n}$$

$$\bar{x} = \frac{3+5+3+2+4+1+8}{7}$$

$$\bar{x} = \frac{26}{7}$$

$$\bar{x} = 3.71$$

X	$x-\bar{x}$	$(x-\bar{x})^2$	$\lvert x-\bar{x} \rvert$
3	3-3.71= -0.7	$(-0.7)^2 = 0.49$	$\lvert -0.7 \rvert = 0.7$
5	5-3.71= 1.3	$(1.3)^2 = 1.69$	$\lvert 1.3 \rvert = 1.3$
3	3-3.71= -0.7	$(-0.7)^2 = 0.49$	$\lvert -0.7 \rvert = 0.7$
2	2-3.71= -1.7	$(-1.7)^2 = 2.89$	$\lvert -1.7 \rvert = 1.7$
4	4-3.71= 0.3	$(0.3)^2 = 0.09$	$\lvert 0.3 \rvert = 0.3$
1	1-3.71= -2.7	$(-2.7)^2 = 7.29$	$\lvert -2.7 \rvert = 2.7$
8	8-3.71= 4.3	$(4.3)^2 = 18.49$	$\lvert 4.3 \rvert = 4.3$
$\sum x = 26$		$\sum (x-\bar{x})^2 = 31.43$	$\sum \lvert x-\bar{x} \rvert = 11.7$

For Variance:

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

$$s^2 = \frac{31.43}{7}$$

$$s^2 = 4.49$$

For S.D:

$$\therefore S.D = \sqrt{s^2}$$

$$S.D = \sqrt{4.49}$$

$$S.D = 2.119$$

For M.D:

$$\therefore M.D = \frac{\sum |x-\bar{x}|}{n}$$

$$M.D = \frac{11.7}{7}$$

$$M.D = 1.671$$

4. Goals scored by teams A and B in a football season are given. Use relative standard and mean deviations to find which team performed more consistently?

Goals scored	0	1	2	3	4
Number of games A played	27	9	8	5	4
Number of games B played	17	9	6	5	3

FOR TEAM A:

For A.M:

$$\therefore \bar{x} = \frac{\sum x}{n}$$

$$\bar{x} = \frac{27+9+8+5+4}{5}$$

$$\bar{x} = \frac{53}{5}$$

$$\bar{x} = 10.6$$

No of Games (x)	Frequency (f)	fx	$x-\bar{x}$	$(x-\bar{x})^2$	$\lvert x-\bar{x}\rvert$	$(x-\bar{x})^2 f$	$\lvert x-\bar{x}\rvert$ f
27	0	0	16.4	268.96	16.4	0	0
9	1	9	-1.6	2.56	1.6	2.56	1.6
8	2	16	-2.6	6.76	2.6	13.52	5.2
5	3	15	-5.6	31.36	5.6	94.08	16.8
4	4	16	-6.6	43.56	6.6	174.24	26.4
	$\sum f = 10$	$\sum fx = 56$				$\sum (x-\bar{x})^2 f = 284.4$	$\sum \lvert x-\bar{x}\rvert$ f $= 50$

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For Variance:

$$\therefore Var = s^2 = \frac{\sum (x-\bar{x})^2 f}{\sum f}$$

$$s^2 = \frac{284.4}{10}$$

$$s^2 = 28.44$$

For S.D:

$$\therefore S.D = \sqrt{s^2}$$

$$S.D = \sqrt{28.44}$$

$$S.D = 5.332$$

For Relative S.D:

$$\therefore Re\,lative S.D = \frac{S.D}{\bar{x}}$$

$$Re\,lative S.D = \frac{5.332}{10.6}$$

$$Re\,lative S.D = 0.5031$$

For M.D:

$$\therefore M.D = \frac{\sum |x-\bar{x}| f}{n}$$

$$M.D = \frac{50}{10}$$

$$M.D = 5$$

For Relative M.D:

$$\therefore Re\,lative \quad M.D = \frac{M.D}{\bar{x}}$$

$$Re\,lative S.D = \frac{5}{10.6}$$

$$Re\,lative S.D = 0.471$$

(Note: Do part B of this question by your-self)

5. Find range, variance, standard deviation and mean deviation in mass of 50 blocks of metal as distributed in the following data:

Mass of block(in Kg)	7.1-7.3	7.4-7.6	7.7-7.9	8.0-8.2	8.3-8.5	8.6-8.8	8.9-9.1
Number of blocks	3	5	9	14	11	6	2

Class Limit	Class Mark (x)	Class Boundary	Frequency (f)	fx	$x-\bar{x}$	$(x-\bar{x})^2$	$\|x-\bar{x}\|$	$(x-\bar{x})^2 f$	$\|x-\bar{x}\|$ f
7.1 – 7.3	7.2	7.05 – 7.35	3	21.6	-0.9	0.81	0.9	2.43	2.7
7.4 – 7.6	7.5	7.35 – 7.65	5	37.5	-0.6	0.36	0.6	1.8	3
7.7 – 7.9	7.8	7.65 – 7.95	9	70.2	-0.3	0.09	0.3	0.81	2.7
8.0 – 8.2	8.1	7.95 – 8.25	14	113.4	0	0	0	0	0
8.3 – 8.5	8.4	8.25 – 8.55	11	92.4	0.3	0.09	0.3	0.99	3.3
8.6 – 8.8	8.7	8.55 – 8.85	6	52.2	0.6	0.36	0.6	2.16	3.6
8.9 – 9.1	9	8.85 – 9.15	2	18	0.9	0.81	0.9	1.62	1.8
			$\sum f = 50$	$\sum fx = 405.3$				$\sum (x-\bar{x})^2 f = 9.81$	=17.1

$$\therefore \bar{x} = \frac{\sum fx}{\sum f}$$

$$\bar{x} = \frac{405.3}{50} = 8.1$$

$$\therefore Var = s^2 = \frac{\sum (x - \bar{x})^2 f}{\sum f}$$

$$s^2 = \frac{9.81}{50}$$

$$s^2 = 0.1962$$

$$\therefore S.D = \sqrt{s^2}$$

$$S.D = \sqrt{0.1962}$$

$$S.D = 0.443$$

$$\therefore M.D = \frac{\sum |x - \bar{x}| f}{\sum f}$$

$$M.D = \frac{17.1}{50}$$

$$M.D = 0.342$$

$$\therefore Range = R = x_{(largest \quad value)} - x_{(\text{smallest} \quad value)}$$

$$R = 9.15 - 7.05$$

$$R = 2.1$$