

### Problem Statement 1:

You survey households in your area to find the average rent they are paying. Find the

Standard deviation from the following data:

\$1550, \$1700, \$900, \$850, \$1000, \$950

Solution:

$$\text{Standard Deviation} = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$

Where  $n$  = no. of values

$x$  = each value

$\bar{x}$  = mean

$x$	1550	1700	900	850	1000	950
$(x - \bar{x})$	391.67	541.67	-258.33	-308.33	158.33	-208.33
$(x - \bar{x})^2$	153405.38	293406.38	66734.38	95067.38	25068.38	43401.38

Here  $n = 6$

$$\begin{aligned}\bar{x} = \text{mean} &= \frac{1550 + 1700 + 900 + 850 + 1000 + 950}{6} \\ &= 1158.33\end{aligned}$$

$$\begin{aligned}\sum (x - \bar{x})^2 &= 153405.38 + 293406.38 + 66734.38 + 95067.38 \\ &\quad + 25068.38 + 43401.38 \\ &= 677083.28\end{aligned}$$

$$\sum (x - \bar{x})^2 / n-1 = \frac{677083.28}{(6-1)} = \frac{677083.28}{5} = 135416.66$$

$$\text{Standard deviation} = \sqrt{135416.66} = 367.99$$

**Problem Statement 2:**

Find the variance for the following set of data representing trees in California (heights in feet):

3, 21, 98, 203, 17, 9

Solution:

$$\text{Variance} = \frac{\sum (x - \bar{x})^2}{n-1}$$

Where  $\bar{x}$  = mean ;  $x$  = values ;  $n$  = no. of values

$x$	3	21	98	203	17	9
$x - \bar{x}$	-55.5	-37.5	40.5	146.5	-41.5	-49.5
$(x - \bar{x})^2$	3080.25	1406.25	1640.25	20880.25	1722.25	2450.25

$$\bar{x} = \text{mean} = \frac{3+21+98+203+17+9}{6} = \frac{351}{6} = 58.5$$

$$\text{Variance} = \frac{\sum (x - \bar{x})^2}{n-1} = \frac{31179.5}{5} = 6235.9$$

### Problem Statement 3:

In a class of 100 students, 80 students passed in all subjects, 10 failed in one subject, 7 failed in two subjects and 3 failed in three subjects. Find the probability distribution of the variable for number of subjects a student from the given class has failed in.

Solution:

Total no. of students = 100

No. of Students passed in all subjects = 80

No. of students failed in one subject = 10

No. of students failed in two subjects = 7

No. of students failed in three subjects = 3

Probability of failing in 0 subjects  $P(X=0)=0.8$

Probability of failing in 1 subject  $P(X=1)=0.1$

Probability of failing in 2 subjects  $P(X=2)=0.07$

Probability of failing in 3 subjects  $P(X=3)=0.03$

Probability distribution can be shown as

x	0	1	2	3
P(X)	0.8	0.1	0.07	0.03