Dispersion Measurements

•The Standard deviation is given by:

• standard deviation =
$$\sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

• Example:

The standard deviation for 5, 6, 2, 8, $9 = \sqrt{7.5} = 2.73861$

• In Excel:

=stdev(range of cells)

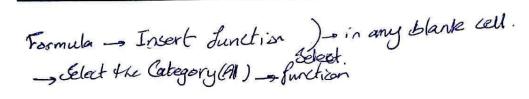
Central Tendency Measurements

- The median is the middle value of the data after sorting.
 - If n is odd then Median = $x(\frac{n+1}{2})$
 - If *n* is even then Median $=\frac{x(\frac{n}{2})+x(\frac{n}{2}+1)}{2}$

• Example: The median for 4, 3, 4, 12, 16 = 9The median for 4, 6, 4, 12, 19, 16 = 10.5

• In Excel:

=median(range of cells)



Central Tendency Measurements

- The mode is the most frequently occurring
- Example:

The mode for 2, 2, 9, 6, 12, 8 = 2

The mode for 2, 2, 4, 6, 7, 8, 4 = 2 and 4

The mode for 2, 6, 9, 16, 12, 8, -2, 0.4 = Not available (no mode)

• In Excel:

=mode (range of cells)

Dispersion Measurements

Dispersion: Range, variance, and standard deviation

- Range: Max Min
- Example:

The range for 2, 6, 8, 9, 12 = 12-2=10

• In Excel:

=max(range of cells) - min(range of cells)



ik can be written directly without inserting a function twice

Dispersion Measurements

- The variance is given by: variance = $\frac{1}{n-1} \sum_{i=1}^{n} (x_i \bar{x})^2$
- Example:

The variance for 5, 6, 2, 8, 9 = 7.5

$$\bar{x} = \frac{1}{n} \sum_{i=1}^{5} x_i = \frac{2+5+6+8+9}{5} \neq 6$$

x	2	5	6	8	9	Total sum	
$(x_i - \bar{x})$	-4	-1	0	2	3	0 = sum of residuals	
$(x_i - \bar{x})^2$	16	1	0	4	9	30	

$$\frac{30}{4} = 7.5$$

• In Excel:

=var(range of cells)

Traviance - dispersion

direct Relationship

positive = abnormal = sick

True Positive (TP)

 Number of cases where the patient tests positive on a disease when he/she actually has the disease.

i.e.,

- Patient has the disease.
- The test gives positive result for the disease (test says patients have the disease).

the positive, that the doctor told is for the disease positive Example:

If the patient "has an allergy" and the test is positive → True positive.

False Positive (FP) that the doctor told is false

 Number of cases where the patient tests positive on a disease when he/she actually does not have the disease.

i.e.,

- Patient does not have the disease.
- The test gives positive result for the disease (test says patients have the disease).

Example:

If the patient "doesn't have an allergy " and the test says "yes".

No=healthy = normal = negative