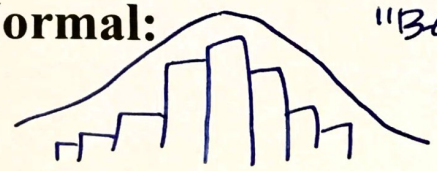
Notes 7-2

Sec 1 H **Measures of Spread – Std. Deviation & Histograms** **Unit 7**

Vocabulary

- **Distribution:** how the data is spread out.

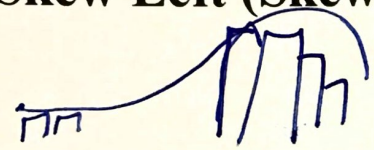
- **Normal:**



"Bell curve" average.
* most data occurs in the middle of the range.

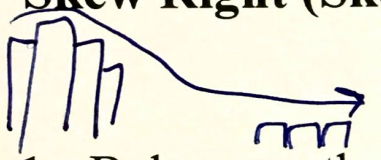
$\bar{x}$ & med are in the SAME BAR

- **Skew Left (Skew Negative):**



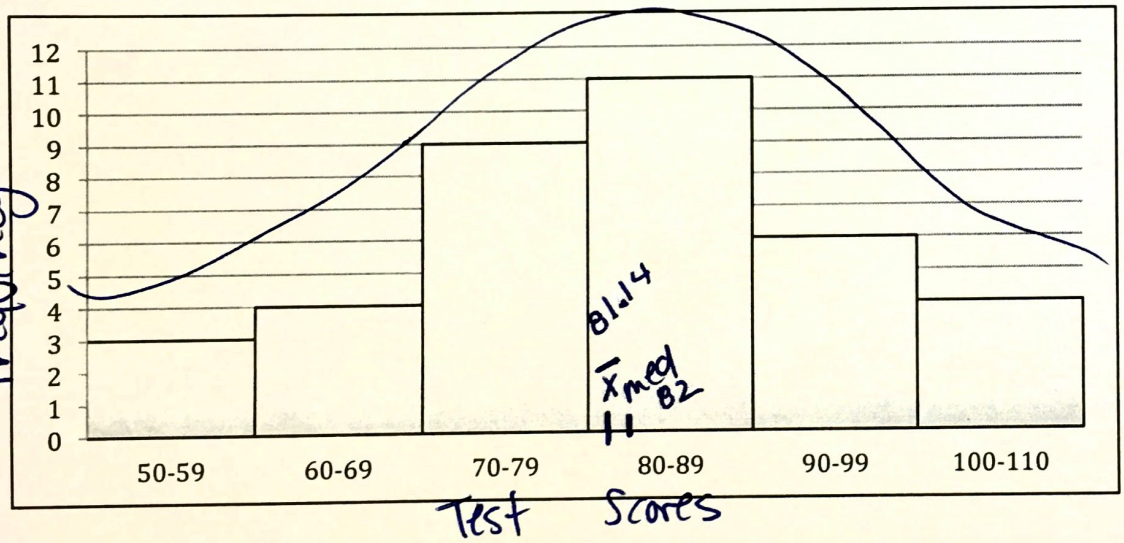
* Most of the data is concentrated on right side, but some data on left LOWERS the $\bar{x}$.

- **Skew Right (Skew Positive):**

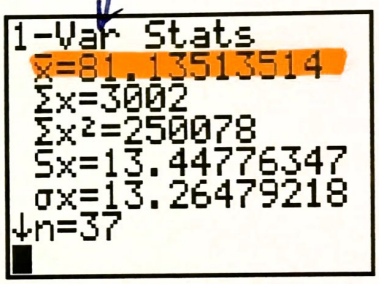


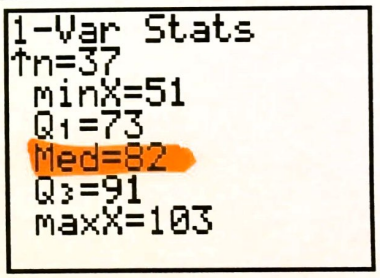
* most data is low/left.
$\bar{x}$ is pulled HIGHER.

Ex. 1: Below are the test results from a math class.



class average





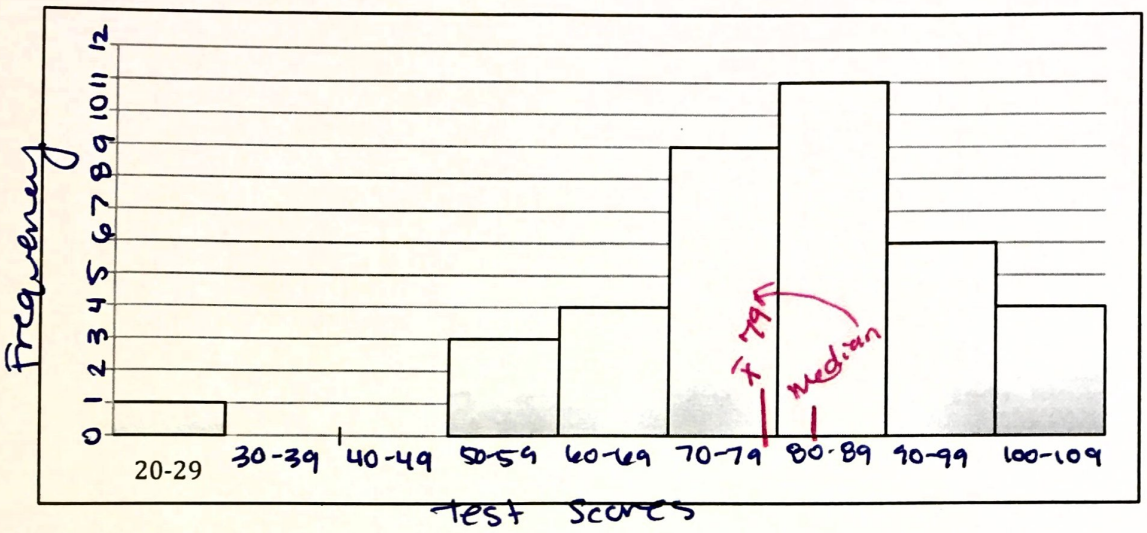
a) Mark the median and mean in the interval in which they occur.

b) Determine if the distribution is normal, skew left, or skew right.

* the $\bar{x}$ & med occur in the same interval (bar)

c) Label the titles on each axis.

Ex. 2: Below is a histogram of the same class except a test score of 25 was added to the data.




```
1-Var Stats
x̄=79.65789474
Σx=3027
Σx²=250703
Sx=16.0897421
σx=15.87662352
↓n=38
```

```
1-Var Stats
↑n=38
minX=25
Q1=73
Med=82
Q3=91
maxX=103
```

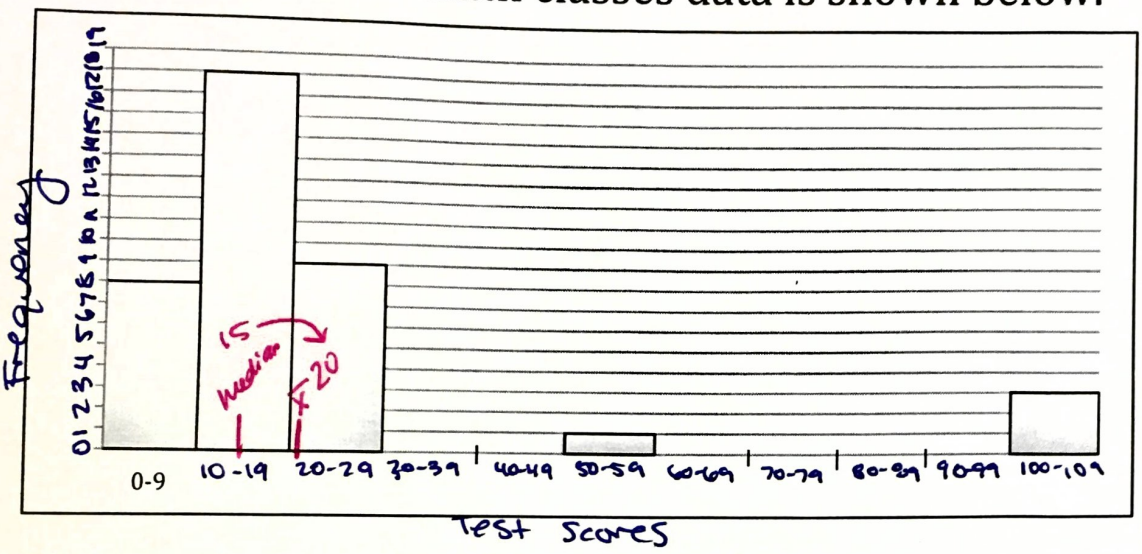
a) Finish labeling the histogram on both axes and titles.

b) Mark the median and mean in the interval in which they occur.

c) Determine if the distribution is normal, skew left, or skew right.

* that 1 test score dropped the class average

Ex. 3: A different math classes data is shown below.




```
1-Var Stats
 x=20.10526316
 Σx=764
 Σx²=31862
 Sx=21.11844266
 σx=20.83871583
↓n=38
```

```
1-Var Stats
↑n=38
 minX=2
 Q1=10
 Med=15
 Q3=21
 maxX=100
```

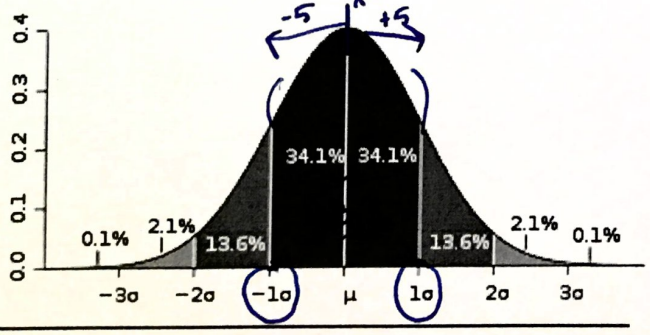
a) Finish labeling the histogram on both axes and titles.

b) Mark the median and mean in the interval in which they occur.

c) Determine if the distribution is normal, skew left, or skew right.
- those 3 high scores made the average HIGHER.
- They're "skewing" the data.

Measures of Spread

A statistic that tells you how *dispersed*, or spread out, data values are.



Standard Deviation: A number that shows how much variation or "dispersion" there is from the mean. A **low** standard of deviation indicates that the data points tend to be very close to the mean. A **high** standard of deviation indicates that the data are spread out over a large range of values.

"Give & take"

$$\sigma = \sqrt{\frac{\left(x_1 - \bar{x}\right)^2 + \left(x_2 - \bar{x}\right)^2 + \ldots + \left(x_n - \bar{x}\right)^2}{n}}$$

Ex. 4: Find the standard deviation for the waiting times in each data set.

Office A	Office B
14, 17, 18, 19, 20, 24, 24, 30, 32	8, 11, 12, 16, 18 18, 18, 20, 23

a) Find the standard deviation for Office A using the formula.

OFFICE A

$\bar{x} = 22$

$\sigma = 5.68$

The average wait time was 22 mins, give or take 5.68 minutes.

OFFICE B

$\bar{x} = 16$

$\sigma = 4.50$

The average wait time was 16 min. give or take 4.50 minutes.

b) Use your graphing calculator to find the standard deviation for Office B

- Hit the [STAT] button.
- Hit [ENTER] on 1: Edit…
- Clear the existing lists
  - Arrow UP to highlight $L_1, L_2, \ldots$
  - Hit [CLEAR]
  - Hit [ENTER]
- Enter the data points using the down arrow or [ENTER] to move down the list.
- Hit the [STAT] button.
- Arrow over to the right to the CALC menu
- Hit [ENTER] on 1: 1-Var Stats
- Tell the calculator which list your data is in by using [2nd] then [1] or [2]
- Use the down arrow to move to the second screen of information.

c) Calculate one standard deviation above and below the mean.

OFFICE A

Below: 16.32 Above: 27.68

OFFICE B

Below: 11.5 Above: 20.5