Notes 7-2

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

Vocabulary

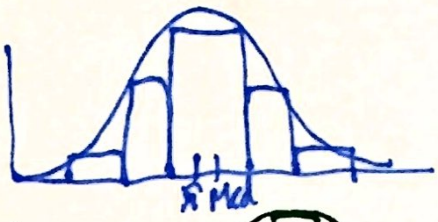
- **Distribution:** the look of the graph

  Spread → Range, Standard Deviation

- **Normal:**

  The data is evenly distributed

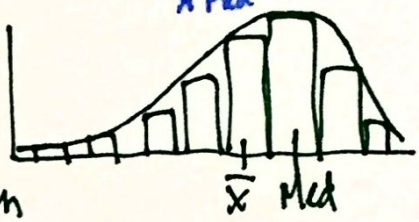
  ($\bar{x}$) Mean & Median are in the same interval



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

  The data is pulled to the left

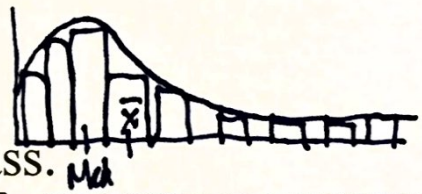
  Mean is in a interval to the left of the Median



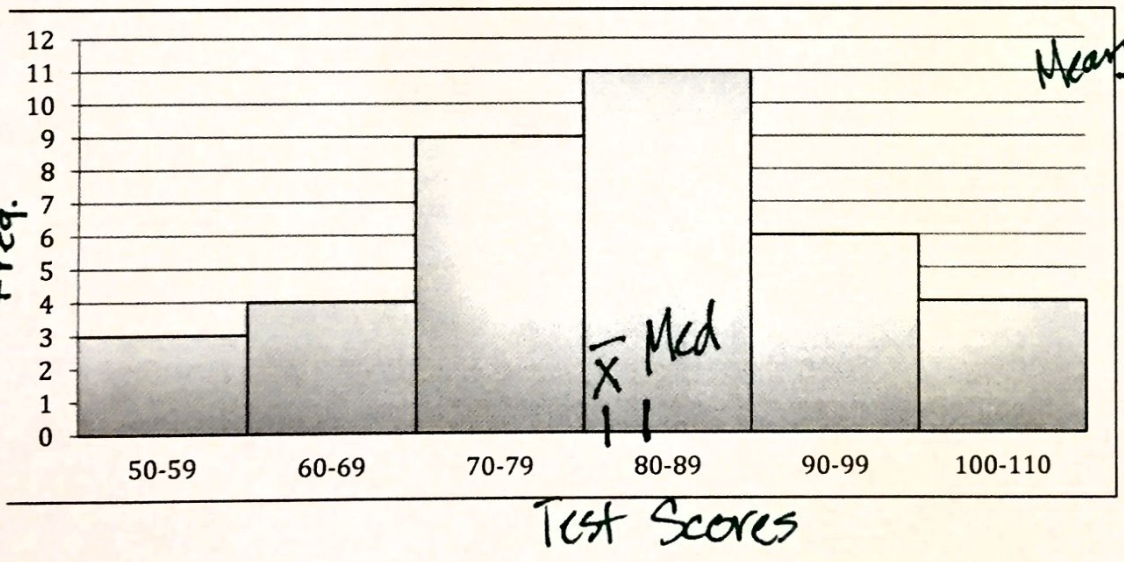
- **Skew Right (Skew Positive):**

  The data is pulled to the right

  Mean is in a interval to the Right of the Median



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



Mean →

```
1-Var Stats
x̄=81.13513514
Σx=3002
Σx²=250078
Sx=13.44776347
σx=13.26479218
↓n=37
```

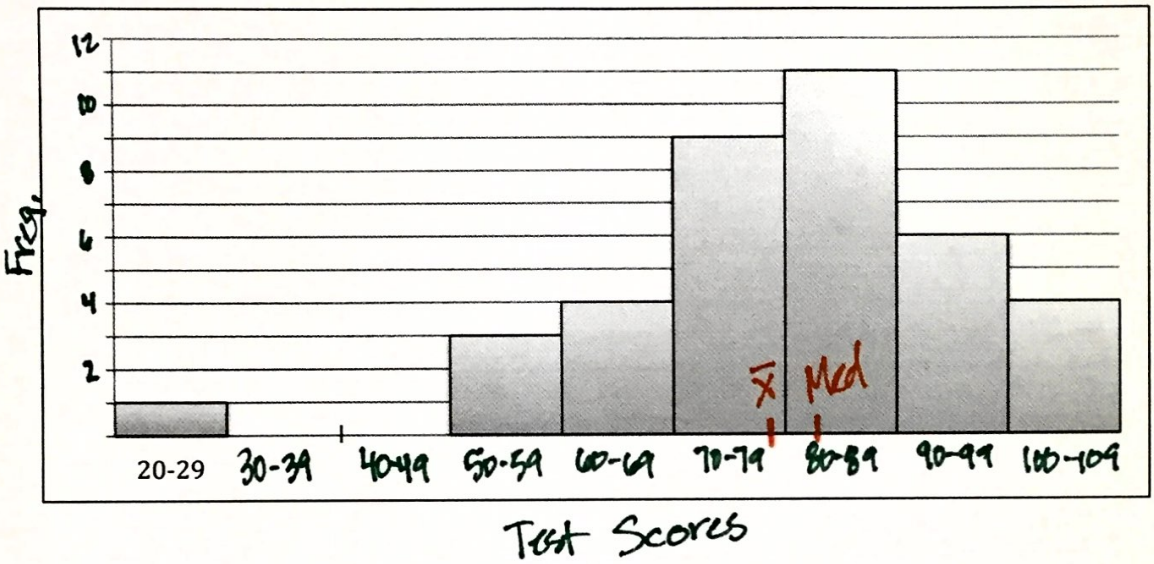
```
1-Var Stats
↑n=37
minX=51
Q1=73
Med=82
Q3=91
maxX=103
```

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.

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
```

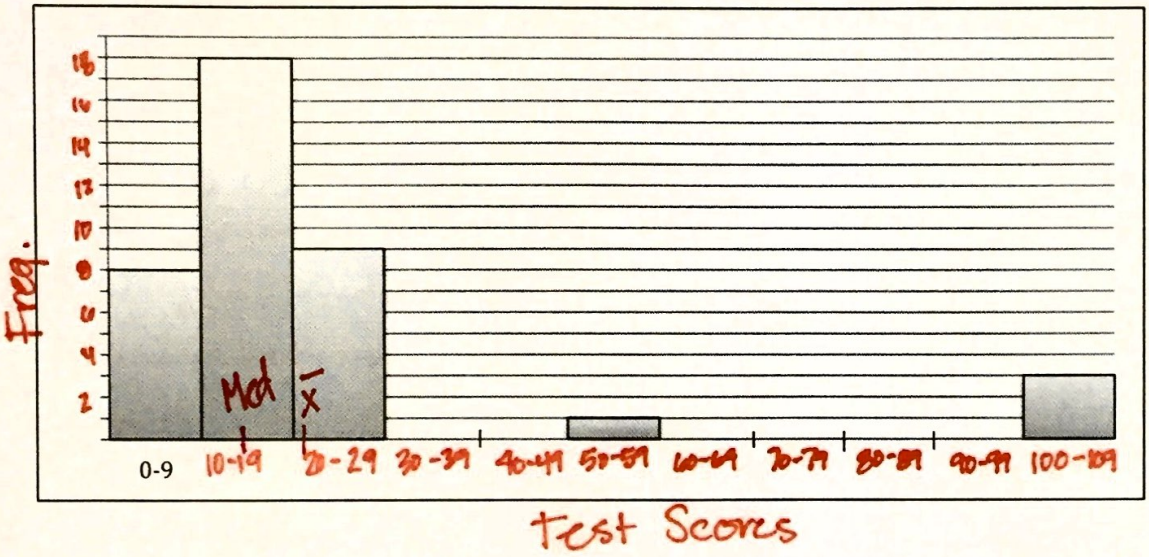
```
1-Var Stats
↑n=38
 minX=25
 Q1=73
 Med=82
 Q3=91
 maxX=103
```

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.

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




```
1-Var Stats
 x̄=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.

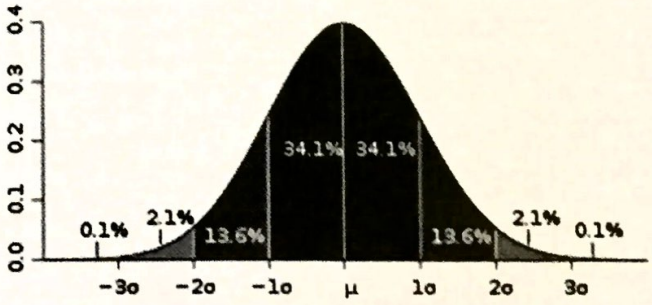
b) Mark the median and mean in the interval in which they occur.

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

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.



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

Sigma → Standard Deviation

n → total # of data points

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

$\bar{x}$: 22

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.

$14-22=-8$ $24-22=2$
$17-22=-5$ $30-22=8$
$18-22=-4$ $32-22=10$
$19-22=-3$
$20-22=-2$
$24-22=2$

$64+25+16+9+4+4+4+64+100$

$\frac{290}{9} = \sigma = 5.68$

-5.68 +5.68
Below: 16.32 $\bar{x}$: 22 Above: 27.68

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.

$\bar{x}$: 16

σ: 4.50

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

Below: 11.5 $\bar{x}$: 16 Above: 20.5
-4.5 +4.5