EQ: What is statistics?

I.

- What is Statistics? study of how to collect, organize, analyze and interpret information from data. Used to answer questions.
- What is Data? facts or figures from which conclusions can be drawn
- What are 2 types of data?

Qualitative (Categorical) Data:

involves nonnumeric observations

Quantitative:

data that is numerical

- What are the sources of data?

Population:

refers to all measurements or observations of interest

Sample:

a collection of elements taken from a population

- Two Types of Statistics:

Descriptive Statistics:

Calculates specific statistical values based on given data for a population or sample.

Inferential Statistics:

Uses a sample to make an inference about a population.

EQ: What is

II. How can I represent statistics?

Frequency distribution
- an organized listing of data in a table that shows how many times each item occurs.

Histogram
- graphing data using bars

Example 1: Results from an algebra test.

56, 65, 68, 73, 73, 74, 75, 75, 78, 80, 80, 82, 83, 83, 83, 84, 84, 84, 84, 84, 87, 87, 87, 88, 88, 90, 90, 93, 94, 95, 95, 95, 98, 99, 99

Class Sizes:

$$\frac{\text{Highest value - lowest value}}{\text{\# of classes desired}}$$

$$\frac{99-56}{5} = \frac{43}{5} = 8.6 \approx 9$$

Score	Frequency
56 - 64	1
65 - 73	4
74 - 82	7
83 - 91	15
92 - 100	8
Total	35

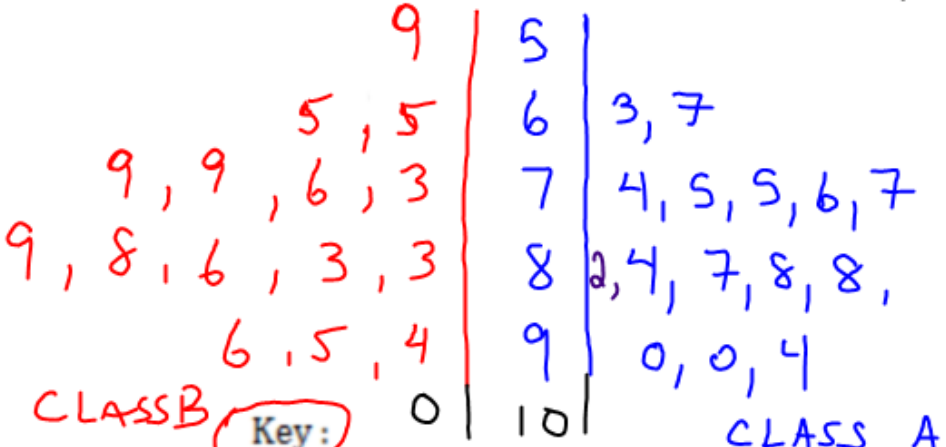
Stem and Leaf Plot

This is a way to organize and display data that allows us to recover the original data from the plot. You can also construct a **side by side stem and leaf plot.** This allows you to compare two sets of data at a time.

Example 2: Results from an algebra test for two classes

Class A: 63, 67, 74, 75, 75, 76, 77, 84, 87, 88, 88, 90, 90, 94, 82

Class B: 59, 65, 65, 73, 76, 79, 79, 83, 83, 86, 88, 89, 94, 95, 96, 100



Example 3: The data below show the ages of every person who took a survey.

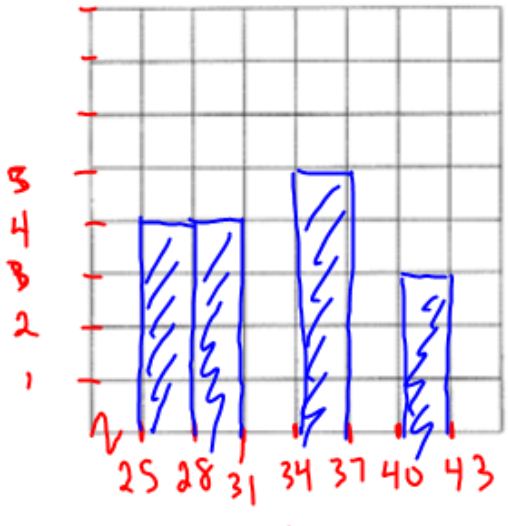
~~26~~, ~~30~~, ~~29~~, ~~41~~, ~~35~~, ~~26~~, ~~34~~, ~~29~~, ~~35~~, ~~30~~, ~~25~~, ~~42~~, ~~26~~, ~~34~~, ~~41~~, ~~35~~

Frequency Distribution:

Ages	Frequency
25-27	4
28-30	4
31-33	0
34-36	5
37-39	0
40-42	3

Total = 16

Histogram:



Stem and Leaf Plot:

2	5, 6, 6, 6, 9, 9
3	0, 0, 4, 4, 5, 5, 5,
4	1, 1, 2

Key: 2|5 means 25

Size: $\frac{42-25}{6} = \frac{17}{6}$

What Statistics are Important:

mean

The average of a set of terms in a data set. It is equal to the sum of the terms divided by the total number of terms in the set.

median

The middle number if the data is arranged in order from least to greatest.

mode

The number or numbers that occurs most frequently in the set of data. There can be more than 1 or none if there are no repeats.

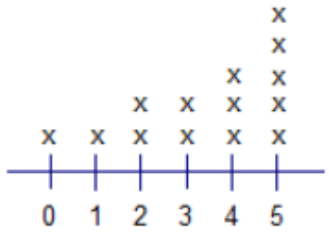
Mean, median and mode are all measure of **central tendency**.
This means we are trying to find one value that best represents the **center of the data**.

The shape of the data:

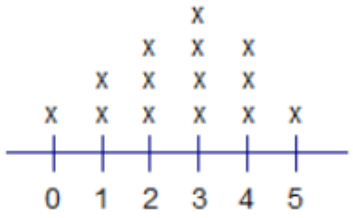
The overall shape of a graph is called the **data distribution**. The shape of the distribution is referred as **skew**, which can reveal important information about the data. We can use a **dot plot** to look at the skew of data. A dot plot uses a number line to show the distribution of data.

Example 4: Consider the data below for number of inches of rain (for a given month) for the cities of three different states received.

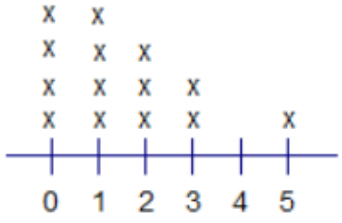
State A:



State B:



State C:



★ Skewed Left ★ symmetrical Skewed Right

The values of the mean, median and mode will typically fall in a unique order depending on the shape of the data set. The order will be:

Left Skewed Data:

Mean < Median < Mode

Symmetrical Data:

Mean ≈ Median ≈ Mode

Right Skewed Data:

Mode < Median < Mean

Example 5: Below are the results of 3 tests. Using these data sets, make a dot plot of each dataset (using 10 point intervals). Use the dot plots to determine the shape of the data set. For each data set, find the mean, median and mode.

Test 1:
43, 45, 50, 50, 55, 58, 59, 60, 62, 65, 68, 69, 72, 75, 78, 85, 89, 95

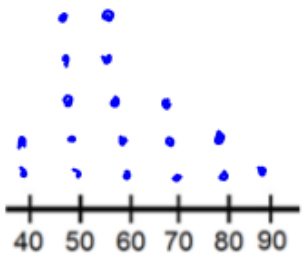
Test 2:
45, 50, 51, 58, 59, 60, 62, 68, 68, 69, 70, 72, 75, 78, 79, 81, 85, 89, 89, 95

Test 3:
45, 59, 60, 62, 68, 70, 72, 75, 78, 79, 80, 81, 82, 85, 85, 89, 95, 98

#1	#2	#3
Mean: $65.\overline{4}$	Mean: 70.15	Mean: 76
Median: 63.5	Median: 69.5	Median: 78.5
Mode: 50	Mode: 68, 89	Mode: 85

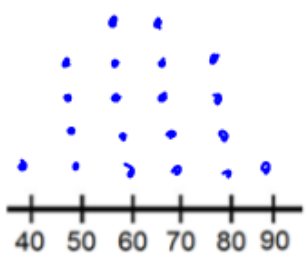
Dot Plots:

Test 1:



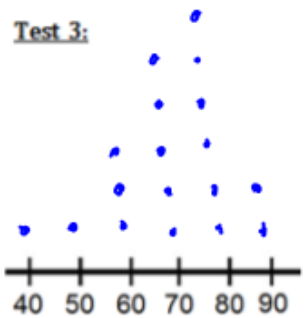
skewed right

Test 2:



symmetrical

Test 3:



skewed Left

Homework #1:
Statistics Worksheet