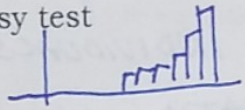
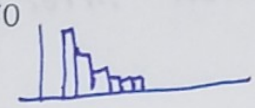
Notes Day 4: Mean and Standard Deviation Population vs. Sample

Warm Up: Label the following skewed left, skewed right, or symmetric and draw a curve.

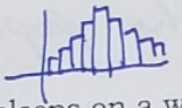
1. The grades on an easy test



2. The number of iphones from ages 15-70



3. The average height of a sample



4. The amount of hours a person sleeps on a weeknight.

Notes: Data Collection

There are two different types of ways researchers can collect data!

OBSERVATIONAL STUDY: observes individuals and measures variables of interest but does not attempt to influence the responses.

EXPERIMENTAL STUDY: deliberately imposes some treatment on individuals in order to observe their responses. The purpose of an experiment is to study whether the treatment causes a change in the response.

An example of an experimental study:
A group of students is interested in knowing if the number of times they can sink a basketball is related to the color of the basketball. The students shoot a series of baskets and record their success using a regulation colored basketball. They then switch to a blue colored basketball and shoot the same series of baskets. A statistical analysis is performed.

An example of an observational study:
A group of students is interested in knowing if there is a correlation between attending an SAT Prep class and scores achieved on the SAT Examination. The students use a survey to collect their data from both students who took an SAT Prep class and those that did not take an SAT Prep class. A statistical analysis is performed.

Identify either Experimental or Observational Study:

1. Over a 4-month period, among 30 people with bipolar disorder, patients who were given a high dose (10g/day) of omega-3 fats from fish oil improved more than those given a placebo. EXP.

2. The leg muscles of men aged 60-75 were 50% to 80% stronger after they participated in a 16-week, high-intensity resistance-training program twice a week. OBS

3. In a test of roughly 200 men and women, those with moderately high blood pressure (averaging 164/89 mmHg) did worse on tests of memory and reaction time than those with normal blood pressure. OBS

4. Among a group of disables\d women aged 65 and older who were tracked for several years, those who had a vitamin B_{12} deficiency were twice as likely to suffer severe depression as those who did not. OBS

Population: THE COLLECTION OF INDIVIDUALS OR OBJECTS ABOUT WHICH INFORMATION IS DESIRED

Sample: A SUBSET of the population

Directions: Name each population and sample.

1. In a class of 30 students, each student is asked if he or she has watched a cartoon within the past month.

POP - 30 STUDENTS

SAMP - 30 STUDENTS

2. People in a live TV audience who had aisle seats were asked if they traveled more than 10 miles to see the game show.

POP - TV Audience

Samp - people in Aisle seats

3. Survey every tenth child entering a park to find out how many rides they plan to go on while visiting the park.

Pop - Children who visit the park

Samp - Every 10TH child

4. Survey all of your friends to see how many can play video games with you.

Sample - all your friends

Pop - all your friends

5. Survey every thirtieth person at the exit door of the zoo to find out if the zoo should increase its hours of operation.

Pop - People @ Zoo

Sample - Every 30TH person

Mean:

$$\bar{X} = \frac{X_1 + X_2 + \cdots + X_n}{n}$$

X_1
X_2
$\vdots$
X_n

From your class survey, find the average height of our class

Sample Pop
S_x or σ_x

Differences between Mean and Median: $\sigma x = 3.356171761$

Let's add a Giant to our class who is 8 feet 11 inches tall! 107

New Mean: 68.2, 67.34

New Median: 65, 66.5

- Mean is NOT Resistent to outliers
- Median IS Resistent to outliers.

Standard Deviation

If you ask several people to estimate the number of people in a crowd their estimates will usually differ. The mean or median would measure the Central Tendency of the estimates, but neither of these statistics tell how widely people's estimates differ. Measuring variability, or Spread, in numerical data allows a more complete description than just stating a measure of central tendency.

Definition:

- **Standard Deviation** → Measures the spread of data away from the MEAN.
- **Deviation** → THE Difference between a data point and the mean of the data set.

To measure the Spread of data:

1.

2.

3.

Sample: Rubber Band Launch! Take your own Notes Here!