

## Math 142: Monday, Aug 19th, Day 1 Notes

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Agenda for Monday, Aug 19, 2024

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| Introductions and Syllabus | 1 |
| Chapter 1                  | 2 |

## Reminders

- ! Get your class materials
- Mark your calendar for exam dates
- Start process with ADRC if you have an accommodation

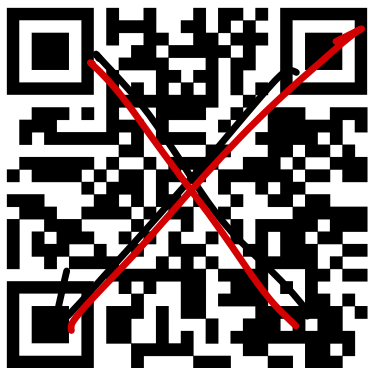
## Introductions and Syllabus

Instructor:

Office:

Email:

## Questions from Syllabus?



## Section 1.1 Basic Definitions

**Statistics** is a science that deals with *the collection, analysis and interpretation of data.*

**Data** consists of information coming from *observations counts, measurements or responses.*

There are two branches of statistics:

1. **Descriptive statistics:** *involves collecting, organizing and summarizing data.*

2. **Inferential Statistics:** *uses probability to determine how confident we can be that our conclusions are correct.*

- A **Population** is the collection of all individuals about which we want to know information.

- A **Sample** is a subset of the population.

- A **Parameter** is a value that represents a property of the population

- we use lower case Greek letters to denote parameters

ex:  $\mu = (\text{mu}) = \text{population mean (average)}$

$\sigma = (\text{sigma}) = \text{population standard deviation}$

- A **Statistic** is a value that represents a property of the sample

ex:  $\bar{x} = \text{sample mean}$ ,  $s = \text{sample standard deviation}$

- A **Variable**

**Example 1.** Determine what the key terms refer to in the following study. We want to know the average amount of money first year college students spend at CLC on school supplies that do not include books. We randomly survey 100 first year students at the college. The average first year CLC student spends \$168 on school supplies that do not include books. The average of those surveyed spend \$174.

- Population: all first year CLC students who spend money on supplies not including books
  - Sample: 100 first year CLC students
  - Parameter:  $\mu = \$168$
  - Statistic:  $\bar{x} = \$174$ ,  $n = \text{sample size} = 100$
- we continue next class

There are two types of variables:

- **Numerical**
- **Categorical**

**Example 2.** Is the variable numerical or categorical?

1. Let  $Y$  be the monthly cost to operate a business
2. Let  $P$  be a favorite pizza place
3. Let  $A$  be an Academic major

## 1.2 Data and Sampling

There are two types of data:

1. Qualitative
2. Quantitative

**Example 3.** Determine if the data is qualitative or quantitative. If the data is quantitative, determine if it is continuous or discrete.

- a) The number of smartphones in a household
- b) The type of car a person drives
- c) Where one goes on vacation
- d) The distance it is from home to the nearest gas station
- e) The tuition for a student's classes this semester
- f) Movie ratings (PG, PG-13, G, ...)

- g) Political party preferences
- h) Weights of NFL wide receivers
- i) Temperature of infants in the hospital nursery
- j) Amount of money (in dollars) won playing video poker
- k) Student ID number

## Sampling Techniques

1. Simple Random Sample
2. Stratified Sample
3. Cluster Sample
4. Systematic Sample
5. Convenience Sample

**Example 4.** Determine the type of sampling used for the following:

Benefits package which includes health insurance, dental insurance, child care, vacation days, retirement plan, etc. You want to conduct a survey of benefits packages available in private business in the state of Illinois. You want a sample of size 200. Some sampling techniques are described below.

1. Assign each tax-id of the private business a number. Choose every 15th number to select to be included in the sample.
2. Pick a random sample of 10 zip code areas and then include all the businesses in each of the selected zip code area.
3. Assign each tax-id of the private business a number. Have a random generator select 200 the businesses to be included in the sample.
4. Group each private business into categories such as Medical, Retail, Financial, Restaurant, Hotel, Manufacturing, Education, other. Then select a random sample of 20 businesses from each type.
5. Send an online survey to each email associated with the tax ID registered to the state and choose the first 200 responses to the survey