

# Math 32 Lecture 01

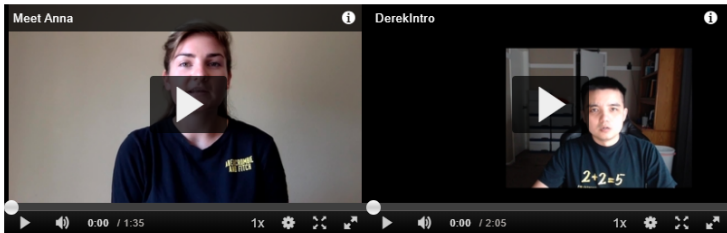
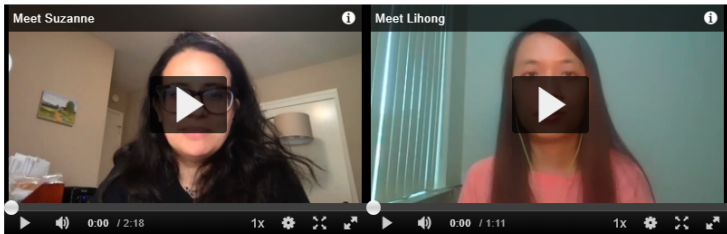
Suzanne S. Sindi<sup>1</sup>   Lihong Zhao<sup>2</sup>

<sup>1</sup>ssindi@ucmerced.edu

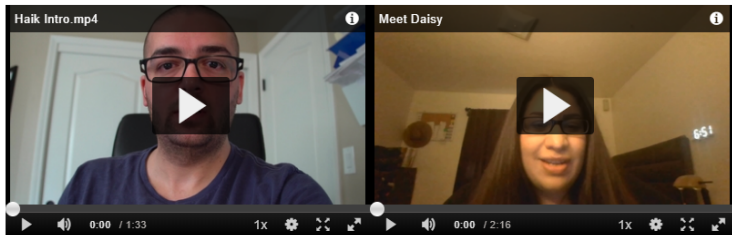
<sup>2</sup>lzhao33@ucmerced.edu

August 27, 2020

# Welcome!



# Welcome!



# Note-taking

## DON'Ts

- Copy everything from the slides
- Copy code line by line

Slides & sample codes will be provided

when the teacher switches slides and you're not done taking notes



## DOs

- Make a few notes for main ideas and programming code
- Capture the lecturer's ideas as accurately and fully as possible
- Ask questions if permitted; if not, jot down questions in your notebook
- Soon after the lecture, review your notes, rewrite skimpy or incomplete parts, and fill in gaps you remember but didn't record

# Why probability?

## Birthday Problem

**Question:** what is the probability that at least 2 people in a room of 30 share the same birthday? For simplicity, ignore leap years.



# Why probability?

## Birthday Problem

**Question:** what is the probability that at least 2 people in a room of 30 share the same birthday? For simplicity, ignore leap years.



**Answer:**

$$1 - \frac{365 \cdot 364 \cdot 363 \cdots 336}{365^{30}} \approx 70.63\%$$

(will go into details later)

# Why probability?

## Birthday Problem

An experiment!

- We ask someone to say their birthday.
- If you hear your birthday, you let us know!
- We repeat!

**Question:** How many people will have to give their birthday before we find a match?!?!?



# Probability and You

## Applied Mathematics

- Does a probabilistic sequence converge or diverge?

## Bioengineering

- What percentage of lyme disease patients would be cured with the current but experimental treatments?

## Chemical Sciences

- What proportion of reactants undergo a reaction early in the reaction?

## Computer Science

- How many computers in a given network would be affected after a virus infection?

## Mechanical Engineering

- What is the probability that two engines of a commercial airplane fail during flight?

## Environmental Science

- What is the concentration of carbon monoxide in the ambient atmosphere in 20 years?



# Why Statistics?

- Statistics is the science of learning from data
- Statistical knowledge is important in scientific studies:
  - plan the studies to ensure that the data are collected efficiently and answer questions relevant to the investigation
  - analyze data, discover what conclusions can be reached from current study and what issues need to be investigated further
- Various applications:
  - weather forecasting
  - insurance
  - drug/vaccination development (effectiveness and safety)

Data + Probability + statistics + Human Smarts = Data Scientists

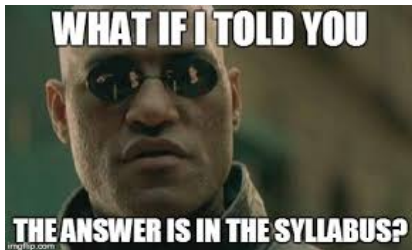
- We constantly generate data
  - 150 billion Gb data in 2005
  - 1.2 trillion Gb data in 2010
  - In 2018, more than 2.5 quintillion ( $10^{18}$ ) bytes of data were created every day
- Massive need for people who can analyze data and extract useful information from data

# Syllabus

- Read the syllabus in full!
- All relevant Contact Information, Zoom Links, Resources.
- Textbook is Free! (Copy posted to CatCourses and Link on Syllabus)
- Please put "Math 32" in the subject line of any/all emails!

## Class Structure

- Synchronous Lectures (first 30 minutes lecture, the rest Q&A).
- Supplemental Videos
- Synchronous Discussion/Labs (*Please attend your registered discussion section.*)



This is not a normal semester!

We are making some adjustments.

No Tests!

Homework is assigned **but not collected**



- 25% for Homework Quizzes (lowest two dropped)
- 25% for Video Quizzes (lowest two dropped)
- 30% for Discussion Sections (lowest two dropped)
- 10% for 1st Video Project
- 10% for 2nd Video Project

# Video and Homework Quizzes

Our homework and video quizzes are designed to reward you for keeping up-to-date with course material. You will have one quiz of each kind each week, it will cover the **previous week's** material.

## Video Quizzes

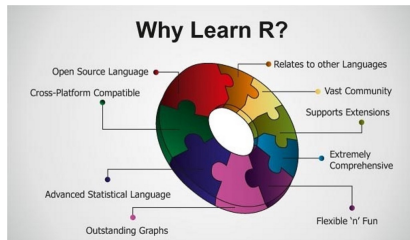
- Videos will complement and supplement lectures.
- Quiz will be comprehension questions from the videos.
- Video Quiz will be posted Tuesday morning by 10am.
- ***Due Wednesday by 11:59pm***

## Homework Quizzes

- Your assigned homework will be posted each Friday morning. (This will not be collected.)
- Homework Quiz will be posted by **the following** Thursday morning by 10am.
- ***Due Friday by 11:59pm***

# Discussion Sections/Labs

- Your discussion sections will involve a mix of problem solving and programming.
- We will be using R!  
Remember, you will always get some example code and your TAs are there to help!
- Your discussion section grade will be both for participation and for completing the weekly activity.



# Video Projects

- You'll have a “midterm” and “final” video project!
- You'll prepare a short video on a topic related to the class.
- Topics will be assigned (or if you are motivated enough!) you can pick one on your own!
- Tentative dates are given on the syllabus, more details as we get closer!

# Extra Credit!

- There will be opportunities for extra credit.
- You can do one extra credit assignment in each topic. We currently have two topics:
  - ① Data is Ugly!
  - ② Choose Your Own Statistics!
- Got a great idea for an extra credit topic?!? Please suggest one!



- This is not a normal semester!
- You likely have more responsibilities than you had before. (We all do!)
- Your number one goal this semester is to take care of yourself.
- Eat right, get sleep, take things each day.
- Prof Sindi is a big fan of Calm, and it's free for you!

