# QR2 introduction

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# Introductions

- name, where you're from, and what did you do over break?

- what are you hoping to get out of this class?

# Warm up: marijuana

Let's play a game...

- You will flip a coin...

- if heads, you will write down the number 1 if your social security number ends with an even digit, otherwise write down 0.

- if tails, you will write down the number 1 if you ever used marijuana (smoke, edible, ...), otherwise 0.

Question: What percentage of students have used marijuana?

# Warm up: marijuana

Law of total probability

$$P(1) = P(1, \text{heads}) + P(1, \text{tails})$$
$$= P(1 \mid \text{heads})P(\text{heads}) + P(1 \mid \text{tails})P(\text{tails})$$

The bar "|" means conditional probability – like fixing a known state of the world.

When you're done, tell me whether you wrote down a 1 or 0!

# What is this class all about?

We will learn methods and tools for advanced quantitative reasoning, i.e., how to effectively debate with data.

$\rightarrow$ Emphasis on data, uncertainty, and statistical modeling
$\rightarrow$ Entry point into higher level coursework in machine learning

This course will be a mixture of practice and principle, and you will leave course with healthy skepticism and a foundational toolbox.

# Class structure

## Foundational topics aka principle (weeks 1 through 5)

(1) Data
(2) Probability
(3) Prediction and Regression

## Practice (weeks 6 through 11)

(1) Precision
(2) Causality
(3) Reasoning and Bayes

# Class structure

Before class
- readings and computing tutorials

During class
- lecture and discussion

After class
- homeworks (free response and computing, one per week)

# Class structure

Evaluation

– homeworks (25%)
– in-class midterm (30%)
– research project (30%)
– engagement/participation (15%)

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### Research project

– 2 per group max
– conduct your own quantitative analysis. Propose a question to test, gather the data, fit a regression model, and assess the output.

## Research project

Conduct your own quantitative analysis. Propose a question to test, gather the data, fit a regression model, and assess the output.

The deliverables will be an *(i)* in-class presentation and *(ii)* report of your findings. Let me know of your tentative research topic and group no later than 2/7. You will spend reading week launching this project.

# Midterm

Written and in-class on 2/6. Mixture of T/F, multiple choice, and free response.

## Github

All course material (exercises, computing, resources) will flow from the following github site:

https://github.com/dpuelz/Quantitative-Reasoning-II

Please bookmark this and visit it often. If you're fancy, fork/clone this repo locally on your computer.

## Expectations

- collaborate with your fellow students

- engage with the readings and in class discussions

- utilize office hours–I'm here to help!

- I will be asking a lot of you because I know you're excellent students :)

- keep up with the fast pace and have fun!