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Course website
http://www.cs.washington.edu/312/

Calendar will have everything on it!
- Probability and statistics

- Books
  - Introduction to Probability (2nd ed.)
    Bertsekas and Tsitsiklis [required]
  - Discrete Mathematics and its Applications
    Rosen [optional]

- Slides
  Most are minor mutations of slides prepared by previous instructors of this course: James Lee, Larry Ruzzo, Pedro Domingos
- **Homeworks ~ 40%**
  Weekly (Out Wed eve, due Thursday in section)
  we will grade a random subset of problems.

- **Daily problem ~ 5-10%**
  shouldn’t take more than 10-20 minutes.
  due at the beginning of most classes.
  can skip it 4 times during the quarter.

- **Midterm & Final ~20% & 35%**

Lots of office hours, starting next week!
- **Probability**
  Counting
  Basic probability
  Conditional probability
  Random variables
  Discrete and continuous distributions
  Expectation and variance
  Tail bounds and the central limit theorem

- **Statistics**
  Maximum-likelihood estimation
  Bayesian estimation
  Hypothesis testing
  Linear regression
  Machine learning
You are trying to diagnose the probability that a woman with a positive mammogram has breast cancer, even though she’s in a low-risk group: 40-50 years old.

- Probability of a woman having breast cancer is 0.8%.
- If someone has cancer, probability of a positive mammogram is 90%.
- If someone doesn’t have cancer, probability of a positive mammogram is 7%.

A woman walks into your office with a positive test.

What’s the probability that she has breast cancer?
pretend you’re a lawyer

OJ simpson murder trial

Prosecutors:
“A slap is a prelude to homicide.”

Defense:
“Less than 1 in 2500 men who commit domestic abuse go on to commit homicide.”

Both were considering the wrong question:
If a woman is murdered and she has been domestically abused, the chances are 90% that her husband is the killer.
Bayes rule

\[ \Pr[A \mid B] = \frac{\Pr[A \land B]}{\Pr[B]} \]
why this course is important

- Reasoning under uncertainty
- Understanding massive data
- Learning patterns
- Exposing liars and idiots
- Making $$$ without coding
- **Probability**
  - **Counting**
  - Basic probability
  - Conditional probability
  - Random variables
  - Discrete and continuous distributions
  - Expectation and variance
  - Tail bounds and the central limit theorem

- **Statistics**
  - Maximum-likelihood estimation
  - Bayesian estimation
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  - Machine learning