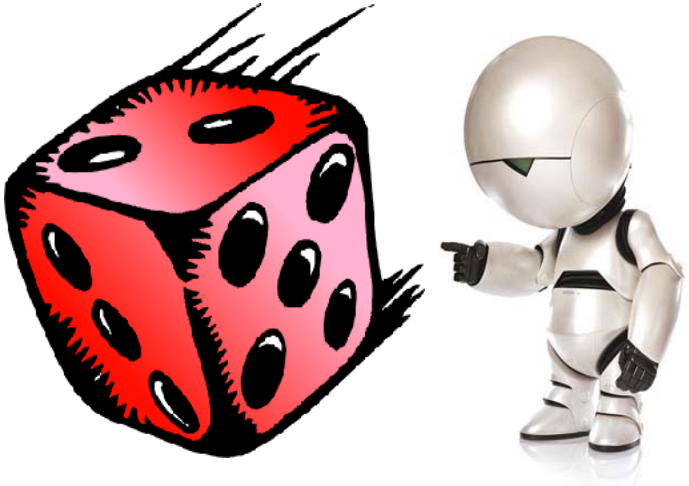
CSE 312: Foundations of Computer Science, II



CSE 312: Foundations of Computer Science, II

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Tom Guo

Stephen Jonany

Kane Swanson

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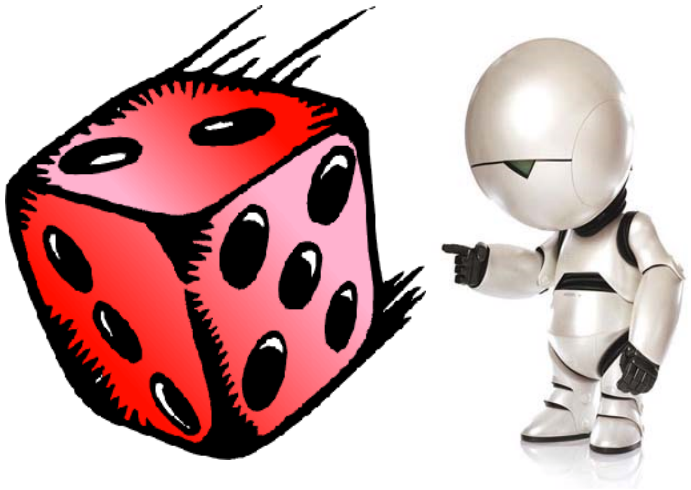

Course website

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

Calendar will have everything on it!

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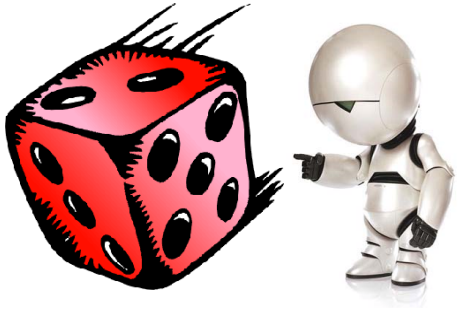
- **Probability and statistics**



- **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

CSE 312: Foundations of Computer Science, II

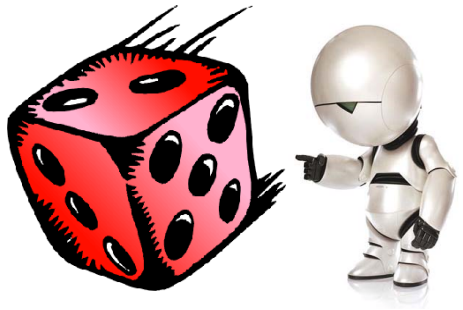
- Homeworks ~ 40%

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!

syllabus

- 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

pretend you're a doctor

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

$$\Pr[A \mid B] = \frac{\Pr[A \wedge B]}{\Pr[B]}$$

Google AdWords

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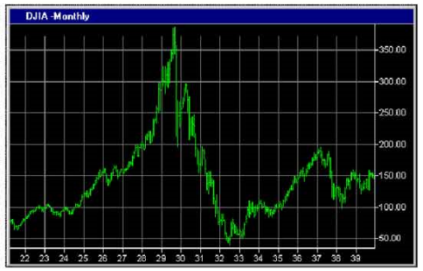
NETFLIX



why this course is important

- Reasoning under uncertainty
- Understanding massive data
- Learning patterns
- Exposing liars and idiots
- Making $$$ without coding

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  - **Counting**
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- **Statistics**
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