DISCRETE MATHEMATICS

IN COMPUTER SCIENCE

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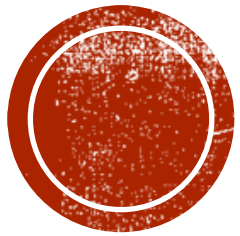
March 4, 2022

Administrivia

- Final exam
  - Mar 13 (Sun) 8–11AM
  - LSC 100 (this room)
- SAS/Conflict/COVID
  - Come talk to me
- Closed-book written exam
- Scope: Module C on counting
- One-page two-sided cheatsheet
  - Must be hand-written



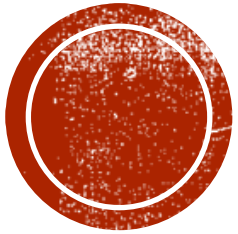
Conditional Probability

Jargon

conditioning

independence

Two Children Problem



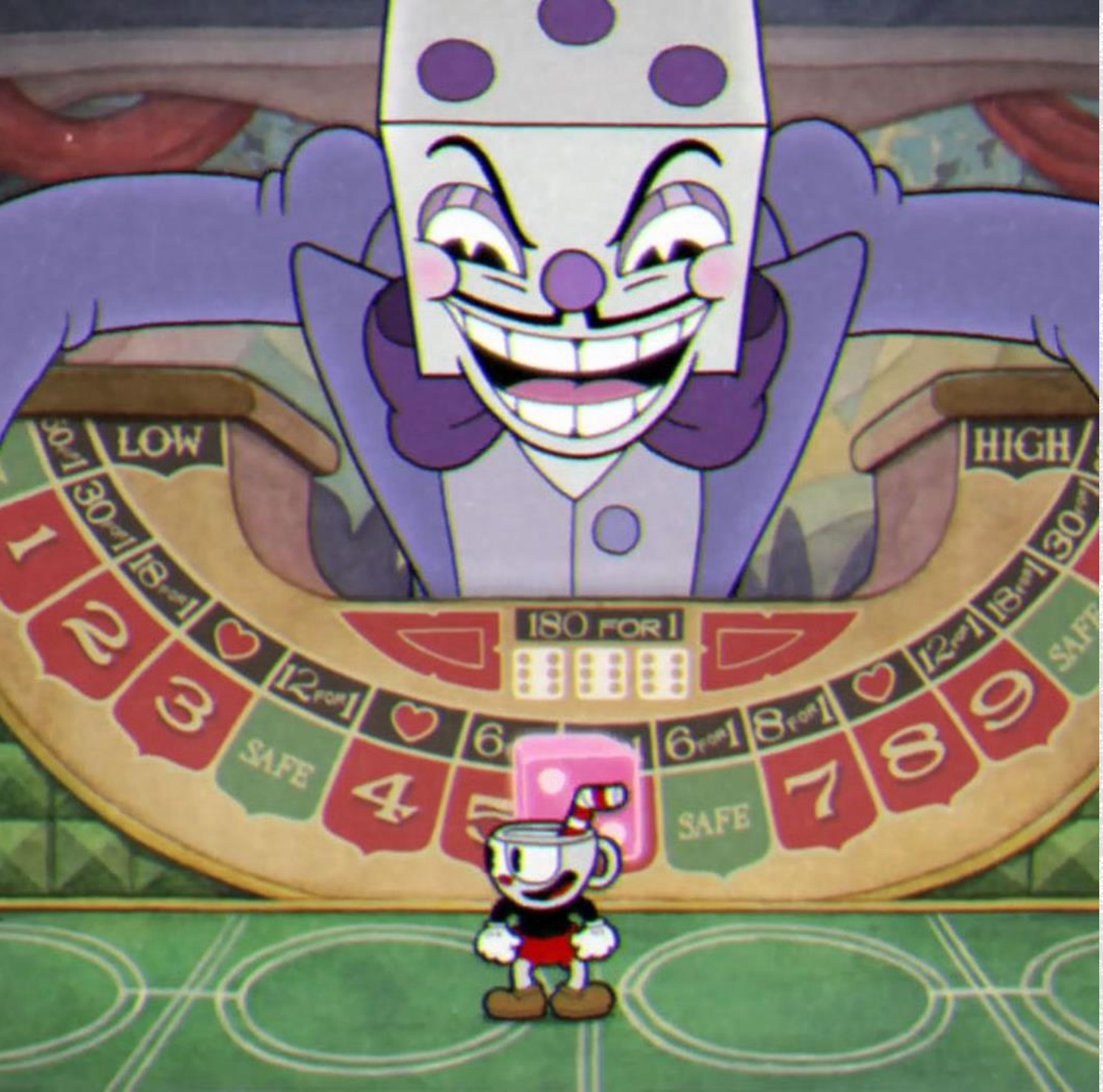
Random Variables and Expectation

Jargon

random variable

indicator variable

expectation



Gambling Games
(not a good idea)

Expected number of tosses?

```
VonNeumannCoin():
    x ← BiasedCoin()
    y ← BiasedCoin()
    if x ≠ y
        return x
    else
        return VonNeumannCoin()
```

Example

Removing coin bias

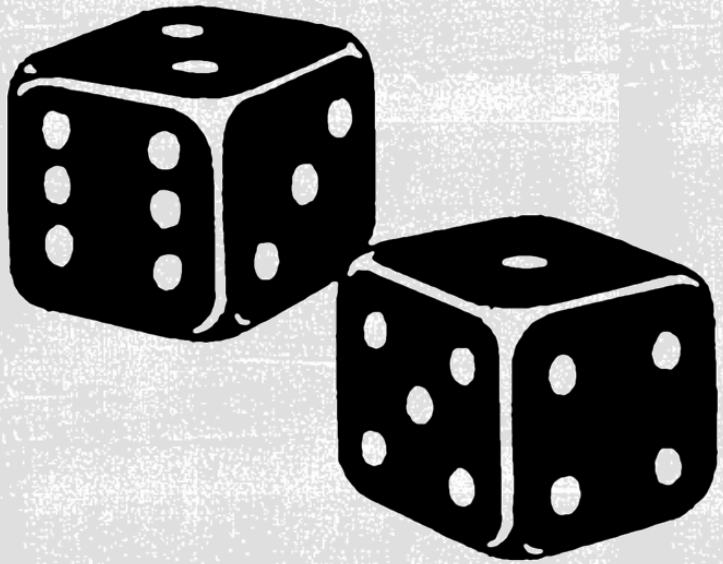
How many tosses on average before getting the first head?

Example

Linearity of Expectation

- $E[\Sigma_k X_k] = \Sigma_k E[X_k]$

- Equality holds even when the variables are dependent to each other!




Gotta Catch 'em All

How many different Pokémon do we have after buying n cards, given there are n Pokémon in total?

Gotta Catch 'em All

How cards we expected to buy to collect all the Pokémon?

Gotta Catch 'em All

How cards we expected to buy to collect all the different Pokémon?

Gotta Catch 'em All

Gambler's Ruin.

Next time.
Last lecture: Probabilistic Method