Quiz 1

Winner's curse

A B each have estimated

- $V_A, V_B \sim$ Uniform $\{1,2,3\}$
- $V = 2$.

Problem 1

$V_A = 1$ Pr (Alice wins)?

Bob: bids

	w.p.	Pr (Alice wins)
1	1/3	1/2
2	1/3	0
3	1/3	0

$1/3 \cdot \frac{1}{2} = \boxed{1/6}$

Problem 2

$V_A = 3$. what is here expected utility? $V - V_A = -1$

Bob bids	w.p	Pr (Alice wins)	utility if wins
1	1/3	1	-1
2	1/3	1	-1
3	1/3	1/2	-1

$$(-1)\left(\frac{1}{3}\right)\left(1 + 1 + \frac{1}{2}\right) = \boxed{-\frac{5}{6}}$$

Problem 3

What is expected utility of the winner?

Bob's \ Alice	1	2	3
1	1	2	3
2	2	2	3
3	3	3	3

3 w.p. $\frac{5}{9} \Rightarrow -1$

2 w.p. $\frac{3}{9} \Rightarrow 0$

1 w.p. $\frac{1}{9} = 1$

$$-\frac{5}{9} + \frac{1}{9} = \boxed{-\frac{4}{9}}$$

Matching Markets

Motivation

- 2 companies C_1 C_2
- 1 Employee
  - prefer C_1 $C_1 > C_2$
- C_1 start interviewing on Feb 15.
- what should C_2 do?
  - Interview Jan 15
    Exploding offer Feb 14.

- Now suppose you're employee.
  You have an offer from C_2 on Feb 13. what do you do?
- Pretend you're C_1?
  Dec 15, Jan 14
  ....

=> Job fairs wreck the semester starts.

unRaveling

Solution 1 : Someone with power prevents unraveling.

Solution 2 someone tells everyone where everyone is going to be hired.

employers: give algorithm ranking over companies

companies: " " over employees

Algorithm decides who goes where.

- US doctors
- NYC highschool
- bunch of other places.

What do you want out of an algorithm?

- "most optimal for society"
  most ppl get top few choices
- strategy proof
- fairness?

→ **Stability.**

There is no pair (employee, company) that both want each other over who the algorithm matched them to.