

STA 255 Tutorial 2

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Agenda

- 1 Why Do We Take Averages
- 2 Kahoot
- 3 Expectation Example
- 4 Conditional Probability Example

Why Do We Take Averages

Why do we take averages?

(Explanation on board)



Expectation Example

Your friend in political science thinks Donald Trump will lose the 2020 Presidential election. So they will sell you a contract that awards you \$1 if he wins and \$0 if he does not. How much should you pay for the contract?



Expectation Example

- 1 If X is a random variable which equals 1 if you win the bet, what type of random variable is it?
- 2 To calculate how much we should pay we need to calculate the _____



Expectation Example

$$E[X] = 1 \times P(\text{Win Bet}) + 0 \times P(\text{Lose Bet})$$

$$E[X] = 1 \times P(\text{Trump Wins}) + 0 \times P(\text{Trump Loses})$$



Conditional Probability Example

I have two children and tell you one of them is a boy, what is the probability the other one is a boy? Assume the probability of having each is 50%.



Conditional Probability Example

		Child 2	
		Boy	Girl
Child 1	Boy	BB	BG
	Girl	GB	GG

		Child 2	
		Boy	Girl
Child 1	Boy	0.25	0.25
	Girl	0.25	0.25

Conditional Probability Example

		Child 2	
		Boy	Girl
Child 1	Boy	0.25	0.25
	Girl	0.25	

$$\begin{aligned}P(\text{Both boys} \mid \text{At least one boy}) &= \frac{P(\text{Both boys} \cap \text{At least one boy})}{P(\text{At least one boy})} \\&= \frac{P(\text{Both boys})}{P(\text{At least one boy})} \\&= \frac{.25}{.25 + .25 + .25} \\&= \frac{1}{3}\end{aligned}$$