

Chapter 7.3
Tuesday, Week 6

Warmup

What is the probability that a die landed on a 6 given that the number was even?

Today is Tuesday. What is the probability that a fair coin will land on heads?

Today is Tuesday. What is the probability that today is Wednesday?

I pick a random day of the week to visit Berkeley and I see students going to a Discrete Mathematics lecture. What is the probability that today is Wednesday?

Bayes' Theorem

You test coins for a living. Say you know that there is a 50% chance a coin is fair and a 50% chance that it always lands on tails. You flip it 10 times and get 9 tails and 1 head. What are your updated expectations?

Say you know there is a $1/10000$ chance that a coin lands on heads 90% of the time and a $9999/10000$ chance that it is fair. You flip 18 heads out of 20. Is it more likely that it is fair or biased?

Puzzle

Your friend flips 2 coins out of your view. You look at 1 of the coins and see that it is heads. What is the chance that the other one is heads as well?

Explanation 1: The two flips are independent, so whether the first one was heads does not affect the second flip. Therefore there is a $1/2$ chance that the other coin is heads.

Explanation 2: You now have the information that at least one of the two coins is heads, which narrows your possibilities down to three: HH, HT, and TH. Only one of these is HH, so the chance that the other coin is heads is only $1/3$.

What is the answer?