Bayes handout (1)

the strange underwear

1. Let's say that you are living with your partner. You've been living together for a year, and you expect that you will be together for years to come.

You have no particular reason to think that your partner is cheating on you.

What is the probability that he or she is cheating?

2. Then one day you come home from a week-long business trip and discover a strange pair of underwear in your bedroom.

For the sake of this example, let's say that this is not a same-sex relationship. The underwear that you found is the type associated with your gender, but it's not yours.

Now, you must update the probability that you assign to your hypothesis—that is, that is update P(C).

(1) We are going to calculate the probability that your partner is cheating given this new piece of evidence.
(2) What is the probability of finding this underwear given that your partner is cheating?
(3) What is the probability of finding the underwear given that your partner is *not* cheating?

a marble jar example

There are two jars of marbles.

In the first jar, 60 percent of the marbles are blue, and 40 percent are non-blue. In the second jar, 35 percent are blue, and 65 percent are non-blue. A fair coin is going to be flipped. If the coin lands heads up, a marble will be selected from the first jar. If the coin lands tails up, the marble will be taken from the second jar.

The coin is flipped, and a marble is selected from one of the two jars—but how the coin landed is not revealed. The color of the marble is, thought. It is blue.

Use Bayes' rule to find the probability that the blue marble came from jar 1.