

W02 - Homework

Conditional probability

01

Conditional probability - algebra games

Assume this data:

$P[A_1]$	$P[A_2]$	$P[A_3]$	$P[B A_1]$	$P[B A_2]$	$P[B A_3]$
30%	40%	30%	50%	50%	60%

Find these values:

- $P[B]$
- $P[A_1 | B]$
- $P[A_2 | B]$
- $P[A_3 | B]$

02

Conditioning relation

Suppose you know $P[A \cap B] = 0.036$ and $P[A | B] = 0.18$ and $P[B | A] = 0.60$.

Calculate $P[A]$ and $P[B]$ and $P[A \cup B]$.

03

Interpreting Multiplication - Fund performance

The odds of the Winning Fund outperforming the market in a random year are 15%. The odds that it outperforms the market in a 1-year period assuming it has done so in the prior year are 30%.

What is the probability of the Winning Fund outperforming the market in 2 consecutive years?

Bayes' Theorem

04

Bayes' Theorem - Stolen computer

Someone in a coffee shop “promises” to watch your computer while you’re in the bathroom.

If she does watch it, the probability that it gets stolen is 10%.

If she doesn’t watch it, the probability that it gets stolen is 70%.

You think there’s a 90% chance she is honest enough to watch it, having promised.

When you come back from the bathroom, the computer is gone.
What is the probability that she witnessed the theft?

05

✍ Bayes' Theorem - Inferring die from roll

A bag contains one 4-sided die, one 6-sided die, and one 12-sided die. You draw a random die from the bag, roll it, and get a 4.

What is the probability that you drew the 6-sided die?

06

✍ Bayes' Theorem - DNA evidence

A crime is committed in a town of 100,000 citizens. After all 100,000 citizens' DNA is analyzed, your friend Jim is found to have a DNA match to evidence at the scene. A forensics expert says that the probability of a random person matching this evidence is 0.01%. How likely is it that Jim is guilty?

Independence

TBD

Trees and counting

TBD