ZOMBIES

+

SUPERHEROES

+

BASEBALL PLAYERS

Surprising Results in Statistics

[Part 1 – Superheroes]

BATMAN

AND

SUPERMAN

DECIDE TO SPEND A WEEKEND FIGHTING ALIENS TOGETHER

On Saturday, Batman fights 3 aliens and doesn't beat any of them, while Superman fights 7 aliens and beats 1 of them. They step up their game the next day – on Sunday, Batman fight 7 aliens and beats 5 of them, while Superman fights 3 aliens and beats all 3.

What was Batman's success rate at beating aliens on Saturday? What was Superman's?

Who had a better success rate on Saturday?

What was Batman's success rate at beating aliens on Sunday? What was Superman's?

Who had a better success rate on Sunday?

What was Batman's success rate at beating aliens across the whole weekend?

What was Superman's success rate at beating aliens across the whole weekend?

Who had a better success rate across the whole weekend?

[Part 2 – Baseball Players]

*numbers rounded to make it easier

In baseball, a player's **batting average** is their number of **hits** divided by their number of **at-bats** – what proportion of the time that they're batting they manage to hit the ball. Here are the number of hits and at-bats that two players had in 1995 and 1996:

	1995		1996	
	Hits	At-Bats	Hits	At-Bats
Derek Jeter	12	60	180	540
David Justice	100	400	35	100

What was Jeter's batting average in 1995? What was Justice's batting average in 1995? Which one had the higher batting average in 1995?

What was Jeter's batting average in 1996? What was Justice's batting average in 1996? Which one had the higher batting average in 1996?

What was Jeter's batting average across the two years combined? What about Justice's? Which one had the higher batting average across the two years?

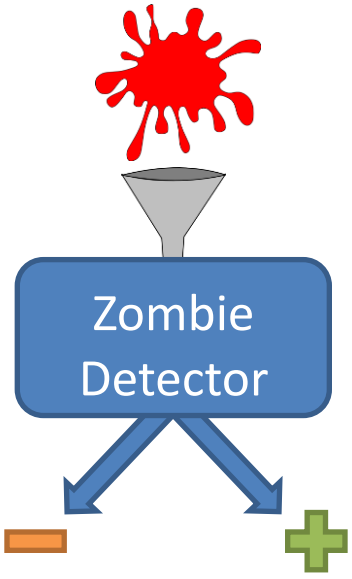
[Part 3 – Zombies]

It turns out that 1 in every 100 people is infected with a ZOMBIE virus!

You can't tell just from looking at someone if they're infected. So you build a zombie detector that takes a sample of a person's blood and says whether they're a zombie (+) or a human (–).

Your detector is right 98% of the time – 98 out of every 100 times you use it, it gives you the right answer.

1% zombies



98% accurate

[Part 3 – Zombies]

You test your math teacher using your zombie detector, and the detector says that she is a zombie. If you had to guess, what do you think the probability is that your math teacher is in fact a zombie?

Let's figure it out step by step instead of guessing, and see if you were right!

Let's say you gather **10,000** random people. How many of them do you expect to be zombies? How many do you expect to be humans?

Now you test all of these people using your detector. Out of the people that are **zombies**, how many are going to give positive results? How many are going to give negative results?

Out of the people that are **humans**, how many are going to give positive results? How many are going to give negative results?

Out of all the positive results that you get, how many are actually zombies? That's the probability we were looking for!

Does the result agree with your guess? How do you explain it?