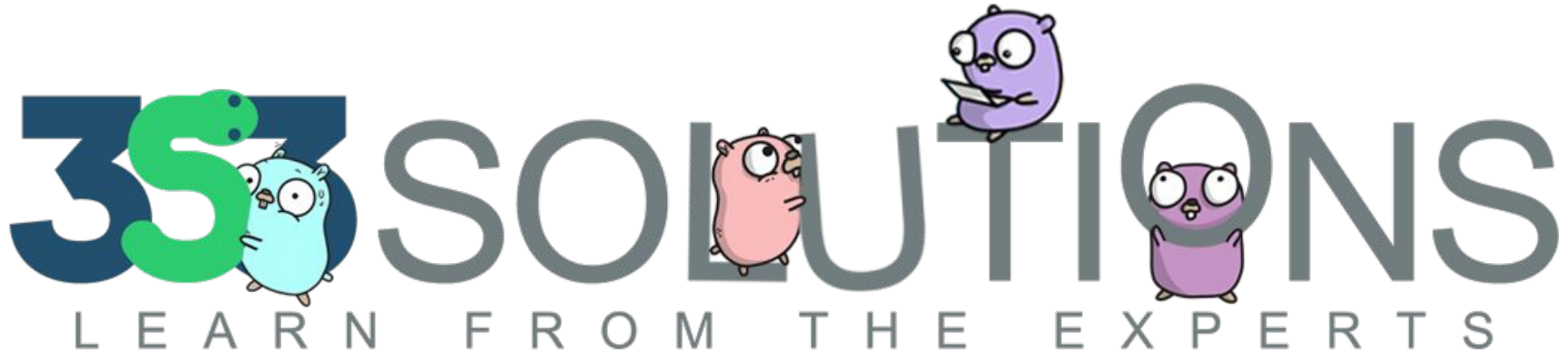# Simulations

For the Mathematically Challenged

Miki Tebeka

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

$$z = \frac{x - \mu}{\sigma} \qquad \rho_{X,Y} = \frac{cov(X,Y)}{\sigma_X \sigma_Y}$$

If you can write a for-loop, you can do statistics.
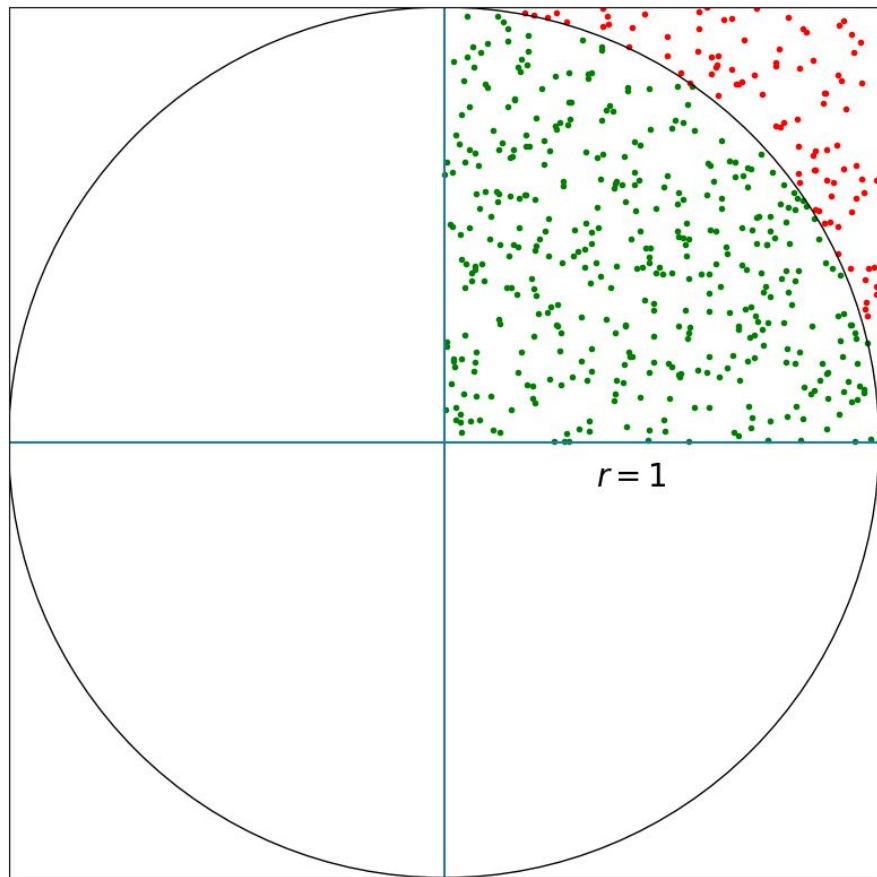
Jake Vanderplas

```
import random
```

The Base for Changes

- Best Catan Tiles
- Calculating π
- Birthday problem
- Sick or Not?
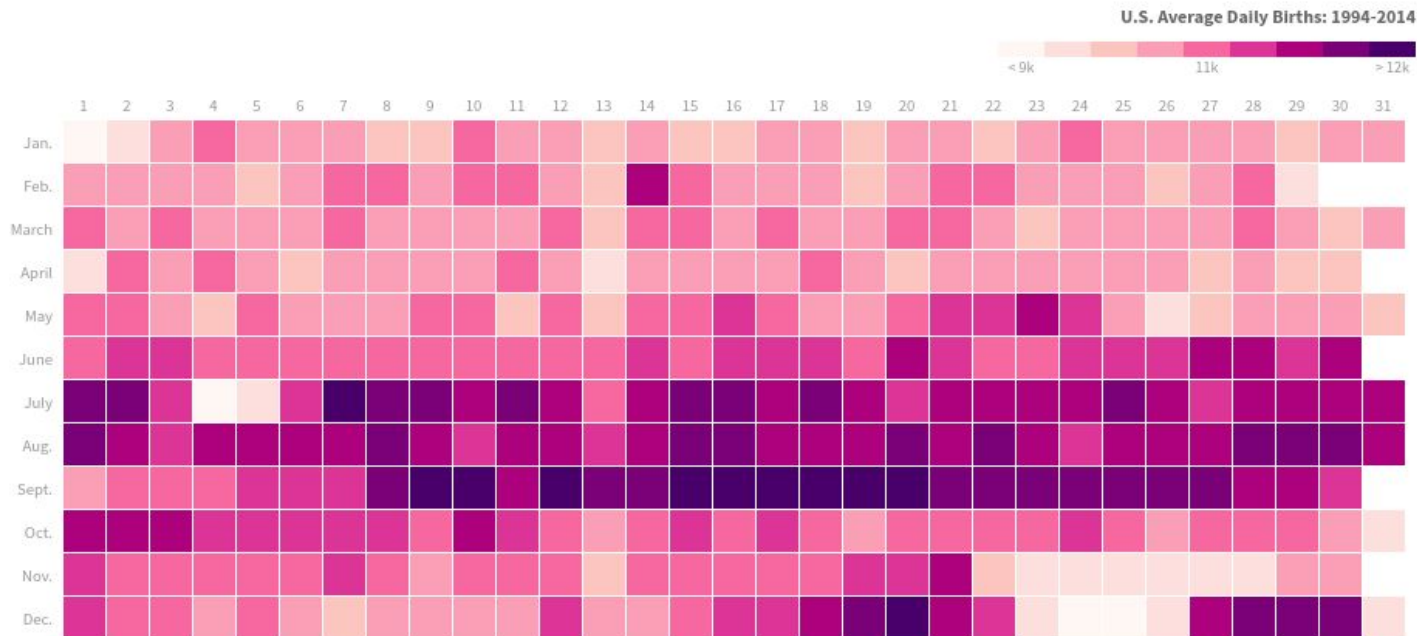- Monty Hall problem

CODE

CODE

CODE

The chances of a piece of bread falling butter side down is directly proportional to the cost of the carpet.

COROLLARIES TO MISTER MURPHY...

All models are wrong, but some are useful. - George Box

HOW POPULAR IS YOUR BIRTHDAY?

Two decades of American birthdays, averaged by month and day.

U.S. Average Daily Births: 1994-2014

< 9k   11k   > 12k

http://thedailyviz.com/2016/09/17/how-common-is-your-birthday-dailyviz/

The test of a disease presents a rate of **5% false positives**. The disease strikes **1/1000 of the population**. People are tested at random, regardless of whether they are suspected of having the disease. **A patient's test is positive. What is the probability of the patient being stricken with the disease?**

	Predicted Sick	Predicted Healthy
Actual Sick	True Positive	False Negative
Actual Healthy	**False Positive**	True Negative

CODE

CODE

Learn More

[Statistics for Hackers](#)
   - Jake Vanderplas

[Monte Carlo Simulation](#)
   - Wikipedia

[SimPy](#)
   - Discrete Simulation

```
$ time python pi.py
... 99% cpu 1:02.23 total
$ time pypy3 pi.py
... 98% cpu 4.838 total
```

Thank You

https://github.com/tebeka/talks/tree/master/pyweb-sim

PYTHON BRAIN TEASERS
EXERCISE YOUR MIND

```
 1 class Player:
 2     # Number of players in the Game
 3     count = 0
 4
 5     def __init__(self, name):
 6         self.name = name
 7         self.count += 1
 8
 9
10 p1 = Player('Parzival')
11 print(Player.count)
```

What will this code print?

30 mind bending teasers & solutions

Miki Tebeka