Sit in groups of 4!
Plan For The Day (PFTD)

• Understand the basic types of numbers and Strings
• Understand how you can aggregate types into Tables and Arrays
• Complete Lab 1
A Frightening Curve: How Fast Is The Ebola Outbreak Growing?

"It's spreading and growing exponentially," President Obama said.

"This is a disease outbreak that is advancing in an exponential fashion," said Dr. David Nabarro, who is heading the U.N.'s effort against Ebola.


Source: Columbia Prediction of Infectious Diseases, World Health Organization
Growth Rate

- The rate of increase per unit time
- After one time unit, a quantity $x$ growing at rate $g$ will be $x \times (1 + g)$
- After $t$ time units, a quantity $x$ growing at rate $g$ will be $x \times (1 + g)^t$
- If after and before are measurements of the same quantity taken $t$ time units apart, then the growth rate is $(\text{after}/\text{before})^{(1/t)} - 1$
Arrays

An array contains a sequence of values

- All elements of an array should have the same type
- Arithmetic is applied to each element individually
- When two arrays are added, they must have the same size; corresponding elements are added in the result
- A column of a table is an array

(Demo)
Ranges

A range is an array of consecutive numbers

- `np.arange(end)`:  
  An array of increasing integers from 0 up to end

- `np.arange(start, end)`:  
  An array of increasing integers from start up to end

- `np.arange(start, end, step)`:  
  A range with step between consecutive values

The range always includes start but excludes end
Text and Strings

A string value is a snippet of text of any length
- 'a'
- 'word'
- "there can be 2 sentences. Here's the second!"

Strings that contain numbers can be converted to numbers
- int('12')
- float('1.2')

Any value can be converted to a string
- str(5)
Discussion Question

Assume you have run the following statements

\[
\begin{align*}
x &= 3 \\
y &= '4' \\
z &= '5.6'
\end{align*}
\]

What's the source of the error in each example?

A. \(x + y\)
B. \(x + \text{int}(y + z)\)
C. \(\text{str}(x) + \text{int}(y)\)
D. \(\text{str}(x, y) + z\)
What’s next?

• Read Chapters 5 and 6 of *Computational and Inferential Thinking*

• Start working on Homework 1