Plan For The Day (PFTD)

• Review the key concepts from Lab 0 & Chapter 3 about Python expressions

• Be able to view data from files in tables
Programming Languages

- Python is popular both for data science & general software development
- Mastering the language fundamentals is critical
- Learn through practice, not by reading or listening
- Follow along in Jupyter notebook
Assignment Statements

- Statements don't have a value; they perform an action.
- An assignment statement changes the meaning of the name to the left of the = symbol.
- The name is bound to a value (not an equation).

```plaintext
hours_per_wk = 24*7
```
Anatomy of a Call Expression

What function to call

Argument to the function

f (27)

“Call f on 27.”
Anatomy of a Call Expression

What function to call
First argument
Second argument

max (15, 27)

Documenting Code

- Why?
  - Communicate the algorithm to a human

- Write a Markdown cell
- Write *comments*
- Use *informative names*
  - Use nouns
  - Abstraction: What does your code do?
  - Implementation: How does it do it?
We organize our data in tables.

A Table is a sequence of labeled columns.

Data within a column should be of the same "type".

<table>
<thead>
<tr>
<th>Name</th>
<th>Code</th>
<th>Area (mi²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Carolina</td>
<td>NC</td>
<td>53,819.16</td>
</tr>
<tr>
<td>South Carolina</td>
<td>SC</td>
<td>32,020.49</td>
</tr>
</tbody>
</table>
Table Operations

- \texttt{t.select(label)} - constructs a new table with just the specified columns
- \texttt{t.sort(label)} - constructs a new table, with rows sorted by the specified column
- \texttt{t.where(label, condition)} - constructs a new table with just the rows that match the condition
Ebola Epidemic, Sept. 2014

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 \( \text{after} \) and \( \text{before} \) are measurements of the same quantity taken \( t \) time units apart, then the growth rate is 
  \( \left(\frac{\text{after}}{\text{before}}\right)^{\frac{1}{t}} - 1 \)
What’s next?

• Read Chapter 4 of *Computational and Inferential Thinking*

• Come ready on Tuesday for Lab