Reminders

- Social distance
- Livestream/async option
- Ed Discussion
- Assignments
  - Assign 0 live
  - APT-0 live
- Lab 0-Friday
  - Attend your assigned section!
- Assessments
  - 3C Assessment-Learning Innovation
  - “Who Are You?”-Ms. Velasco
  - 80% response rate → Extra credit
PFTD

• Programming introduction
  • Algorithms
  • Key instructions
  • Python
  • Values, variables
  • Assignment
  • Strings
  • Comments
  • Operators
People to Know: Luis von Ahn

- Duke (BS, Math)
- Carnegie Mellon (PhD, CS)
- Cryptography
- CAPTCHA, reCAPTCHA
- Duolingo
Algorithms

• Step-by-step solution to problem.
• Solved in a finite amount of time.

• How do you get to the Bryan Center from this class?

• Importance of design first!

• Programs express algorithms in a language a computer understands.
Program (Software) Development

• Define the problem
• Design a solution
• Implement the solution
• Test the solution
• Deliver solution
• Maintain/update solution
Key instructions

• Input
• Output
• Assignments*
• Math/Logic
• Conditionals
• Repetition

*not listed in book
Programming in Python

Shell mode
- From the command line (Python console)
  - Good for seeing the result of one line of code

Program mode
- From PyCharm
  - Good for creating larger programs

```python
if __name__ == '__main__':
    # Your code here
```

```bash
>>> 
```
Interactive Console

- Look in the bottom left corner of PyCharm
- Click on “Python Console”
Values vs. Variables

Values
• 5
• “Hey”
• 3.4
• False

Variables
• num1
• greeting
• gpa
• result

• Naming conventions
  • Must start with letter/underscore
  • Cannot start with a number
  • Case-sensitive
Variables

• Store values so we can use/re-use them in expressions
  • Name associated with storage (spot in memory)
  • Assign value to a variable

• How to read: num = 5, word = "hello"
  • Why say 'gets' or 'is assigned' and not 'equals’
  • We’ll use ‘equals’ later to mean equality
Exploring Language

• Do you first learn how to say something useful or do you learn the rules of grammar
  • Duolingo: El banco esta cerrado
  • How do you say: “she wants coffee?”

• Connecting to things you already know helps with learning!
  • Variables - names, types, values
Names, Types, and Values

- What type is each of these files?
  - homework.pdf, blurp.mp4, egal.jpg
  - Does the name/suffix define the type or is it the bits in the file that defines the type?
  - Value of blurp.mp4 not the same as moo.mp4
  - Type of blurp.mp4 is the same as moo.mp4
  - Name of stairwaytoheaven.mp3 means …
Numeric Python Building Blocks

• Numbers are not everything! But good start
  • Values and arithmetic expressions
  • Integer aka int: 0, 3, -2, 5, …
  • Float: 2.5, 3.6673, 1.938e+120
  • Operators: +, -, *, /, **
  • Operators: // and %

• Demo in Python Console
Summary of Numbers

• Integers are arbitrarily large in Python 3
• Float values do not have infinite precision
  • Floats are for decimal values

• Be attentive to parentheses and precedence
• Understand / and // and %
  • 5/4 not the same as 5//4
  • %: remainder
Assignment

• Assigns a value to a variable.
• Uses “=”

• Assign the value on the right of the = to the variable on the left.
  • age=21

• Are these valid?
  • name=‘Kim’
  • 2=place
  • gpa=3.25
  • student=name
Subtleties

• Variables on LHS and RHS
  • Value compared to Name
  • LHS – Left Hand Side
  • RHS – Right Hand Side

• What happens here?
  • Value compared to Name

• In expressions? Value

num1 = 17
num2 = num1 + 12

var1 = 17
var2 = var1 + 12
var1 = “hello”
var2 = var1 * 3
What’s happening here?

```python
if __name__ == '__main__':
    print("This is a simple program.")
    num1 = 1
    num2 = 2
    sum = num1+num2
    print(sum)
```
Python Strings

• A string is a sequence of characters
  • String literals use single or double quotes
  • "hello" and 'world' are both strings

• Operators we'll use: + and [: ]
  • Concatenation and Slicing
  • Adding and taking apart? Today just adding

• Demo in Console
Types and Conversion

- How do you convert a .mp4 to a .mov?
  - Change the bits from one format to another

- Can we add a string and an integer?
  - What does 5 + "cow" mean?
  - What does 5 * "cow" mean?
  - Why?
Comments

• Notes to yourself (and anyone reading)
• Extremely important for writing good programs
• Different ways to create comments
  • #
  • """
  • """
  • Ctrl-/
Activity 1:
Questions?