Compsci 101
Python Code, Variables

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```
st = f.read().decode('utf-8')
st = st.lower()
total = len(st)
```
B is for …

• Bug
  • What you will always have and need to fix
• Bits
  • Zeros and Ones, like C,G,A,T makes up DNA
• Byte
  • 8 bits that represent a character

• Boolean
  • Type that's true or false
Grace Hopper

- Computer Scientist
- Rear Admiral in US Navy
- One of first programmers for one of first computers: Harvard Mark 1
- Handed out nanoseconds
- First computer bug in 1947

"“The only phrase I've ever disliked is, 'Why, we've always done it that way. ' I always tell young people, 'Go ahead and do it.’”
Announcements

• Survey coming out– complete this week
• Lab 0 is Friday, no Prelab
• Prelab 1 before lab– Install Python/Pycharm
  • Ways to get help:
    • Office hours, consulting hours
    • Post on Ed Discussion – what type of machine, etc
    • Install Fest at Co-lab, Sept 6-7, 2pm-8pm
• Ed Discussion Back channel during lecture
• QZ03 and reading due Tuesday at 10:15am
• Assignment 0 - Blockly due 2/8
Is this the right course for you?

• **CompSci 101**
  • beginner
  • little or no programming experience

• **CompSci 201**
  • 4/5 on AP CS A
  • OR Programming Experience in Python or Java or ?
    • Problem solving with arrays or lists
    • Looping structures (while/for)
    • Writing functions/methods
    • Problem solving with Sets, Dictionaries or maps?
Can’t take CompSci 101 if

• You already took CompSci 201, or CompSci 116, or ENG 103 …..

• You won’t get credit for this course

• This is a beginner course
Practice, Practice, Practice
Practice results in Success
Don’t get behind!!!

• Difficult to catch up…
Plan for the Day (PFTD)

• Look at a sample Python Program
  • OK if you don’t understand it all
• How to run Python Code
  • Run complete program in Pycharm
  • Short code segments with Python Console
    • Python Console is in Pycharm
• Names, types, and values in Python
• Functions in Python
Finish Slides from Last Time
Duke Connection: Fred Brooks '53

• What Would FB Say?
"The most important single decision I ever made was to change the IBM 360 series from a 6-bit byte to an 8-bit byte, thereby enabling the use of lowercase letters. That change propagated everywhere."

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Why is programming fun?
Fred Brooks

• First is the sheer joy of making things
• Second is the pleasure of making things that are useful
• Third is the fascination of fashioning complex puzzle-like objects of interlocking moving parts
• Fourth is the joy of always learning
• Finally, there is the delight of working in such a tractable medium. The programmer, like the poet, works only slightly removed from pure thought-stuff.
Understanding Code

• We will look at an interesting Python program
  • Try to figure out what it does

• You Likely Will NOT understand all this code
• Maybe none of it

• That’s OK
How Breakout Groups Work with Google form links

• Given a bitly link
  • Type it in OR click on it on the calendar page

• What you should do:
  • Introduce yourselves
  • Each person fills out the google form
  • Includes your email, name and netid
  • Discuss each question and fill out
  • Be mindful of time
WOTO-1 Understanding Code
Names, Types, and Values

• Relate to a file. Consider: homework.pdf

• What is its name?

• What is its type?

• What is its value?
Names, Types, and Values

• Relate to a file. Consider: cats.jpg
• What is its name?
  • What is its type?
  • What is its value?
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
Interactive Console

- Short way to look at Python values and expressions
- Look in the bottom left corner of PyCharm
- Click on “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 %
  - Modulus or remainder
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 Python Console
Types and Conversion

• How do you convert a .jpg to a .png?

• Can we add a string and an integer?
Using Python Console

- Not writing a whole program
- Just checking out values or writing simple code

- What is the difference in Python Console of:
  
  >>> print(“a” + “ ” + “b”)

  >>> “a” + “ “ + “b”
Variables

• We use variables to store values so we can use them and 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
Variable idea
1) num = 6
Variable idea
1) \( \text{num} = 6 \)
Anatomy of a variable

• Variables in Python have a type, changeable
  • Initially \texttt{var = 5}, change to \texttt{var = "hello"}
  • Use the \texttt{type(\ldots)} function to determine type, but documentation/comments are better

• Variables are names/labels, references to an object stored elsewhere (basically)
  • My address is “202 Main Street”
  • That’s the name/label, my house is elsewhere
  • For \texttt{var = "hello"}, the string is elsewhere
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? What is value

```
num1 = 17
num2 = num1 + 12

var1 = 17
var2 = var1 + 12
var1 = "hi"
var2 = var1 * 3
```
Basic Python