Compsci 101
Introduction

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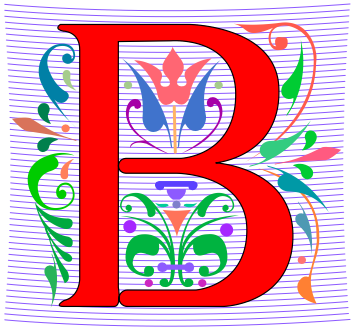
```
st = f.read().decode('utf-8')
st = st.lower()
total = len(st)
```

`B` is for …



- **Bug**
  - What you will always have and need to fix
- **Bits**
  - Zeros and Ones that are our C,G,A,T
- **Break**
  - An easy way out of a loop
- **Boolean**
  - Type that's true or false

Barbara Liskov

- Among first women in US to earn Ph.D. in Computer Science: 1968
- Turing Award 2008, Software Engineering and Programming Languages
- Object-Oriented
  - CLU
- Liskov Substitution Principle

"Every time you exchange e-mail with a friend, check your bank statement online, or run a Google search, you are riding the momentum of her research" – MIT President Rafael Reif about Liskov

Announcements

- Survey coming out– complete this week
- Lab 1 is Friday
- Prelab 1 before lab– Install Python/Pycharm
  - Ways to get help:
    - Office hours, consulting hours
    - Post on Ed Discussion – what type of machine, etc
    - https://colab.duke.edu/resources

- Ed Discussion Back channel during lecture
- QZ03 and reading due Thursday at 10:15am
- Assignment 1 - Blockly due 1/18

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

Understanding Code

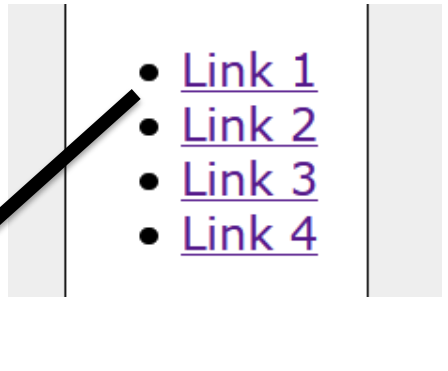
- We will look at an interesting Python program
  - Try to figure out what it does

- 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
  - http://bit.ly/101s22-0111-1
- 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
http://bit.ly/101s22-0111-1

WOTO-2 Understanding Code
http://bit.ly/101s22-0111-2

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?

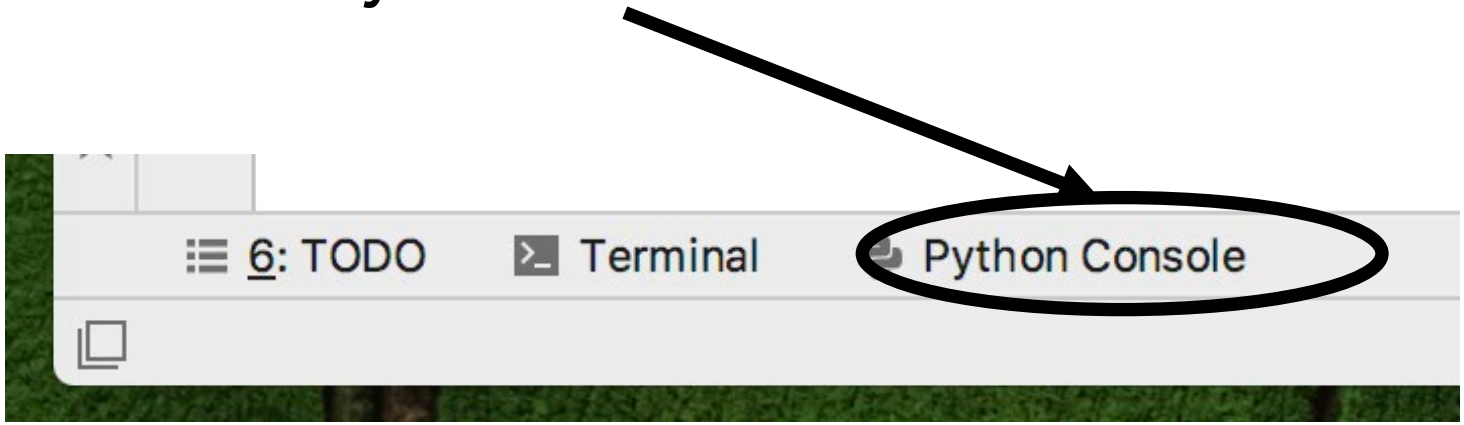
Numeric Python Building Blocks

- **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?
  - 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?

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”
```

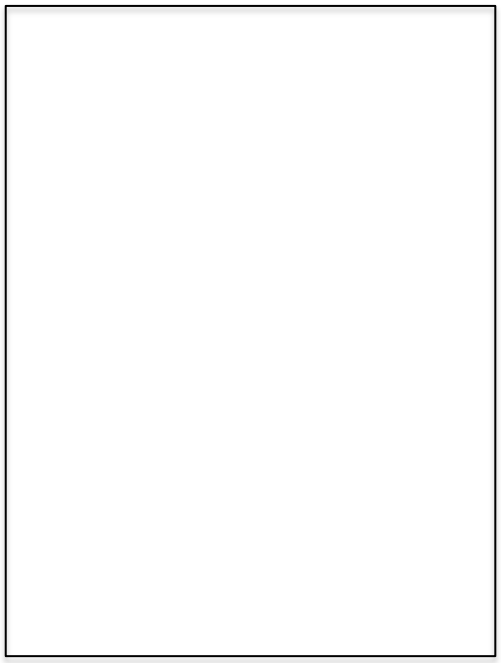
Variables

- 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



Computer

Anatomy of a variable

- **Variables in Python have a type, changeable**
  - Initially `var = 5`, change to `var = "hello"`
  - Use the `type(..)` 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 `var = "hello"`, the string is elsewhere

Subtleties

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

```
num1 = 17
num2 = num1 + 12
```

- What happens here?
  - Value compared to Name

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

- In expressions? What is value

Basic Python
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