CS21: INTRODUCTION TO COMPUTER SCIENCE

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Fall 2018
Swarthmore College
Outline Sept 10:

• Recap last time + finish *graduate.py*

• Mathematical operations and *math* library
  • Pythagorean theorem program

• String operations (length and repetition)
  • X’s and O’s

Reminders
• Lab 1 due Saturday night
• Labs are open all the time, including Clothier basement
• Practice problem *division.py*
THURS 9/13 | 7PM | SCI 256

HOW TO SUCCEED IN CS

BROUGHT TO YOU BY THE
2018-19 NINJAS
Recap Friday
Key ideas

- We will always use `def main():` and then write main indented

- *Expressions* (3+5) vs. *statements* (x = 3+5)
  - In the interpreter, the results of expressions are shown
  - In the editor (i.e. in our code) we need to write full statements

- *Comments*: use hashtag symbol (#)

- User variable names that implicitly show type

- `print(..)` is very powerful! A way to see what is going on and to give the user valuable information

- `input(..)` always returns a string, so may need to convert
graduate.py (example solution)

```
# ask the user for their graduation year and the current year, then compute how many years until graduation.
Author: Sara Mathieson
Date: 9/10/18

def main():
    # ask the user for grad year and current year
    grad_str = input("Enter your graduation year: ")
    grad = int(grad_str)
    curr_str = input("Enter the current year: ")
    curr = int(curr_str)

    # compute years left and display to user
    years_left = grad - curr
    print("You have", years_left, "years left until graduation!")

main()
```
Mathematical operations
Mathematical operations in python

• Addition: 7+2  9
• Subtraction: 7-2  5
• Multiplication: 7*2  14
• Division: 7/2  3.5
• Integer division: 7//2  3
• Exponentiation: 7**2  49
• Mod: 7%2  1

• Precedence rules: “PEMDAS” (Parenthesis, Exponentiation, Multiplication, Division, Addition, Subtraction)
Math Library in python

```python
Python 3.6.2 (default, Sep 4 2017, 14:43:54)
[GCC 4.2.1 Compatible Apple LLVM 8.1.0 (clang-802.0.42)] on darwin
Type "help", "copyright", "credits" or "license" for more information.

>>> import math
>>> math.sqrt(9)
3.0
>>> math.pi
3.141592653589793
>>> math.e
2.718281828459045
>>> math.sin(math.pi/2)
1.0
>>> exit()
```
Program to try with a partner

1) Ask the user for the two (short) sides of a right triangle, then compute and print the hypotenuse.

\[ a^2 + b^2 = c^2 \]
String operations
String operations

• Length: \( \text{len(“swarthmore”)} \) 10
• Empty string: “” length?
• Concatenation: “a” + “b” “ab”
• Repetition: “a”*5 “aaaaa”
Program to try with a partner

1) Ask user for integer n and print 2n x’s.

2) On the next line print 2n o’s.

3) Finally print “xo” n times.
Keyboard shortcuts so far

- **up** and **down** arrows for cycling through previous commands
- **Alt-tab** for switching between terminal and atom
- **tab** to autocomplete a file name or command

- **ATOM**
- **Ctrl-s** for save
- **Ctrl-n** for new file
- **Ctrl-z** undo
- **Ctrl-w** close window

https://www.cs.swarthmore.edu/courses/CS21Labs/f18/docs/using-atom.html