

# CS21: INTRODUCTION TO COMPUTER SCIENCE

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Prof. Mathieson

Fall 2018

Swarthmore College

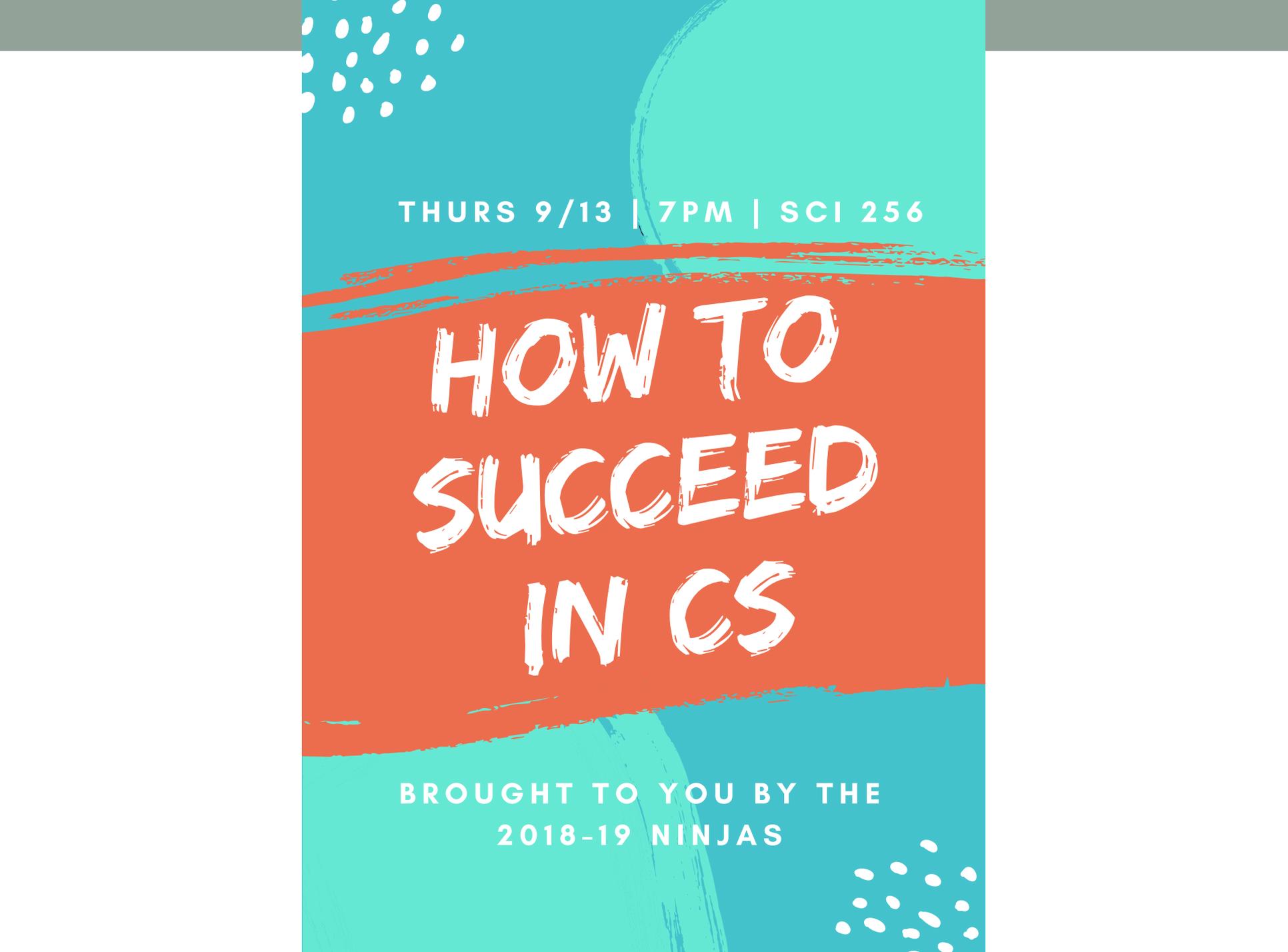
# Outline Sept 10:

Sit at a new computer!

- 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

DEMO

# Mathematical operations in python

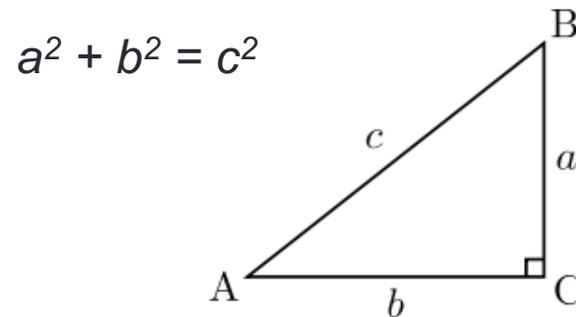
- Addition:  $7+2$  9
- Subtraction:  $7-2$  5
- Multiplication:  $7*2$  14
- Division:  $7/2$  3.5
- Integer division:  $7//2$  3
- Exponentiation:  $7**2$  49
- Mod:  $7\%2$  1
- Precedence rules: “**PEMDAS**” (Parenthesis, Exponentiation, Multiplication, Division, Addition, Subtraction)

# Math Library in python

```
Python 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.



# String operations

# String operations

- Length: `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.

```
Enter a positive integer: 3  
xxxxxx
```

- 2) On the next line print  $2n$  o's.

```
Enter a positive integer: 3  
xxxxxx  
oooooo
```

- 3) Finally print "xo"  $n$  times.

```
Enter a positive integer: 3  
xxxxxx  
oooooo  
xoxoxo
```

# 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>