Computational Thinking
and
Introduction to Python

COSC 101: Intro to Computing I
August 30, 2017
Computational Thinking
Computational thinking is the thought processes involved in formulating a problem and expressing its solution(s) in such a way that a computer—human or machine—can effectively carry out.

—Jeannette M. Wing
Human Computers
Programming is the process of breaking a large, complex task into smaller and smaller subtasks until the subtasks are simple enough to be performed with sequences of these basic instructions.

—How to Think Like a Computer Scientist
Solving Problems at Google Using Computational Thinking

https://www.youtube.com/watch?v=SV VB5RQfYxk
Exercise #1

The following is an algorithm someone wrote for brushing your teeth:

1. Wet the toothbrush
2. Put toothpaste on the toothbrush
3. Brush each side of your teeth for 30 seconds
4. Spit
5. Rinse

Is this algorithm executable? If not, revise it.
Exercise #2

Write an algorithm for making a peanut butter and jelly sandwich:

Exchange with your neighbor and compare what you have written. Are your algorithms the same? Are they both computer executable? Is there anything you are missing?
Exercise #3

For this exercise you will work a partner, introduce yourself.

1. Turn away from your partner so you cannot see their worksheet and draw something. Do not look at what your partner is drawing!

2. Next, write an algorithm explaining how to recreate the drawing for someone who has not seen it.

3. Exchange instructions with your partner. Follow your partner’s instructions to recreate their drawing.

4. Compare your drawings. How well does what you drew match up with what they originally drew? How can your improve your instructions?
Introduction to Python
Question #1

What are the five basic types of instructions used by Python (and nearly every programming language)?

1. Input
2. Output
3. Math and logic
4. Conditional execution
5. Repetition
Question #2

What is the output of the following code?

```python
>>> print("I am so excited to learn Python!")
```

I am so excited to learn Python!
Question #2

What is the output of the following code?

```python
>>> print("six times seven is . . .")
```
```python
>>> 6 + 7
```

```
six times seven is . . .
```

```
13
```

This is a **semantic error** because the code runs, but it does not do what we want it to do.
Question #2

What is the output of the following code?

```python
>>> print("Hello, world")
```

This is a **syntax error**; the code will not run because there is no end parenthesis.
Question #2

What is the output of the following code?

```python
>>> print("the chance of precipitation today is:")
>>> print(7 / 10 * 100)
>>> print("%")

the chance of precipitation today is:
70.0
%
```
Question #2

What is the output of the following code?

```python
>>> 16 / (5 - 5)
```

Traceback (most recent call last):
  File "<pyshell#9>" , line 1, in <module>
    6/0
ZeroDivisionError: division by zero

This is a runtime error because the code is syntactically correct but does not run. In this case the problem is that our code attempts to divide by zero.
Errors

Write examples for each type of error:

• Runtime Error
• Semantic Error
• Syntax Error

Compare your examples with your neighbors