Why do app developers have such high insurance rates?

Because they are always crashing.

Thank you, Kai

Source: 25 computer puns that will LAN you in a pool of laughter. (2018, June 15). Thought Catalog. https://thoughtcatalog.com/erin-cossetta/2018/06/computer-puns/

CMPT 120

Lecture 15 – Graphics and Animation

Python – Introducing Turtle

Last Lecture

- Investigated different kinds of **functions**
- Looked at the execution flow when Python executes our functions using the **Python Code Visualizer**

Review: Different kinds of functions

Activity: Fill this table using the **four functions** we created last lecture

	Function that takes argument(s)	**Function that does not take argument(s)**
Function that returns a result (i.e., a returned value)		
Function that does not return a result (i.e., a returned value)		

Review - Your turn!

- **Problem Statement:**
  - Create a function that prints a character x number of times in a row
- **Requirement:**
  - Let's not forget about the **Generalization Principle**

Review - Function

- Why create functions?
  - Functions make our program easier …
    - **To read**
    - **To implement and modify**
    - **To test and debug**
    - **To re-used in other programs**
  - Functions make our program shorter …
    - **Eliminate repeated code fragments**
- Three guidelines to follow when creating functions
    - **Descriptive name of function**
    - **Parameter(s) or not**
    - **Returns a value or not**

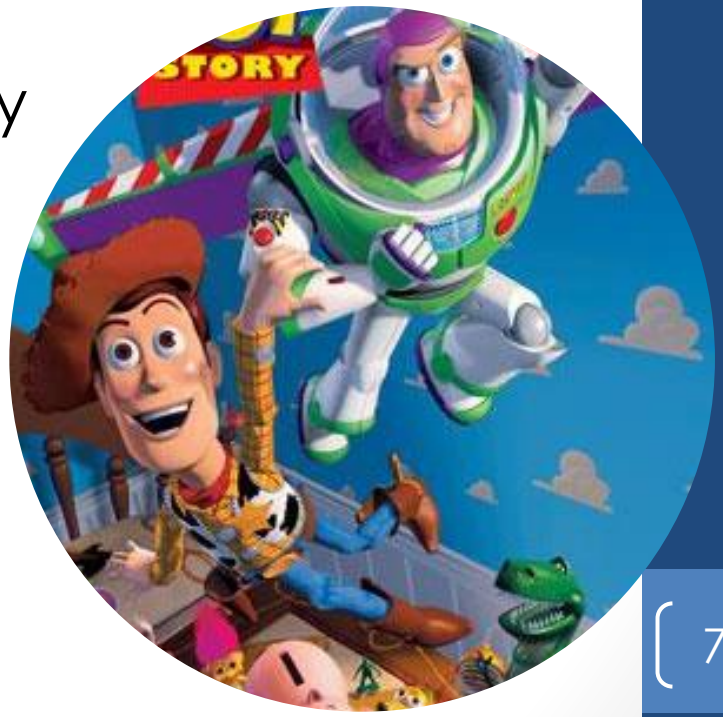
Today's Menu

- We shall introduce another field of Computing Science:
  - **Graphics and Animation**
- We shall introduce a fun Python module:
  - **Turtle**

Graphics and Animation

- Pixar movies and your favourite 3D animated films these days are built with code

- Indeed, **animated movies** and **video games** today rely heavily on 2D and 3D graphics and animation technology



- In this unit, we'll make basic animations using code, and learn how to build complex and beautiful graphics

Graphics and Animation

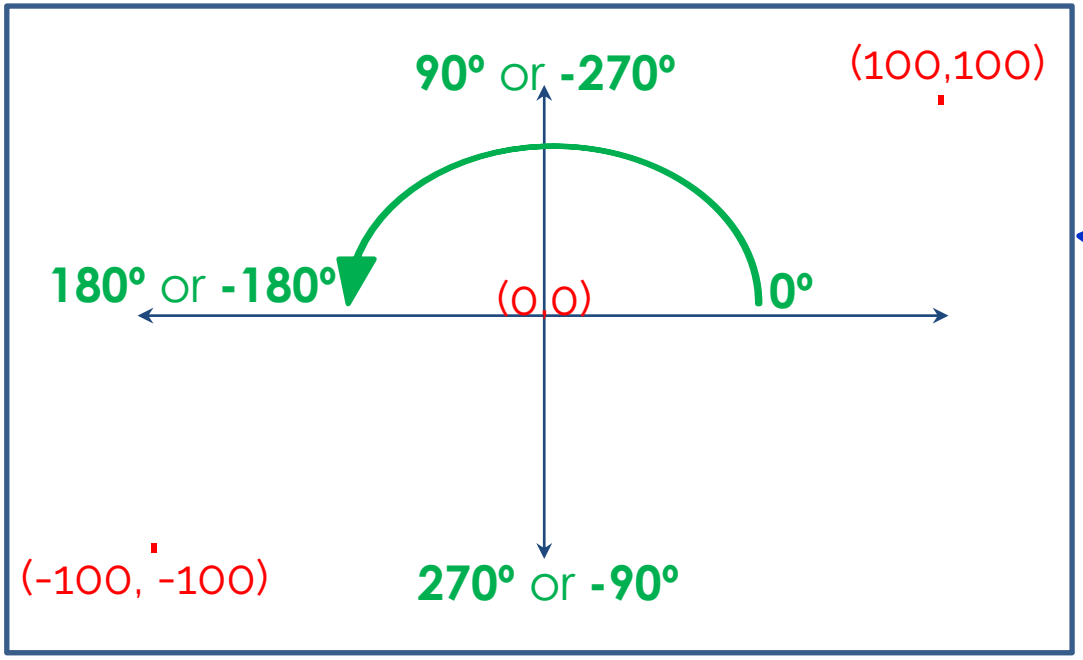
1. **Computing Science**
   - In this unit, we'll learn about the computing science field of **graphics and animation**

2. **Algorithm**
   - One of the algorithms we shall learn is called **recursion**

3. **Python**
   - We'll learn about **Turtle** graphics, and continue learning about **functions** and **loops**

Let's try it!

- **Problem Statement:**
  - Write a program that draws a blue square with a **Turtle**
  - First, we need to know the **Turtle** coordinate system:



How about this!

- **Step 1 - Problem statement:**
  - Write a program that draws a chocolate chip cookie with our Turtle
- **Step 2 - Design**
  - As a software developer, I do not need to be told to create a function ☺
  - I know that the functionality of ***drawing a cookie*** needs to be implemented as a function

But what if I want many cookies?

- Solution:
  - Could I copy and modify the code many times, each instance of the copied code drawing one cookie?

- Hum… We now know that this solution would lead to a lot of repeating code, which is not a good idea!

Why?

But what if I want many cookies?

- **Step 2 - Design**
  - Should I use a **for** loop?

Review - For next lecture

1. How do we create a Turtle object, given the turtle module?
2. What is the keyword necessary to make a `while` loop?
3. What is the keyword necessary to create a function?
4. What is the difference between function parameters and function arguments?
5. Why do we place our functions at the top of our program?

Next Lecture

- More **turtle** and **functions**