How does a computer get drunk?

Thank you Anant!

It takes screenshots!

Source: https://www.rd.com/jokes/computer/

CMPT 120

Lecture 17 – Graphics and Animation
Python – More Turtle and Functions

Last Lecture

- Practice Exam **#4**
- Hand-in your **in-class activity #4** at the end of this lecture

Review – From last lecture

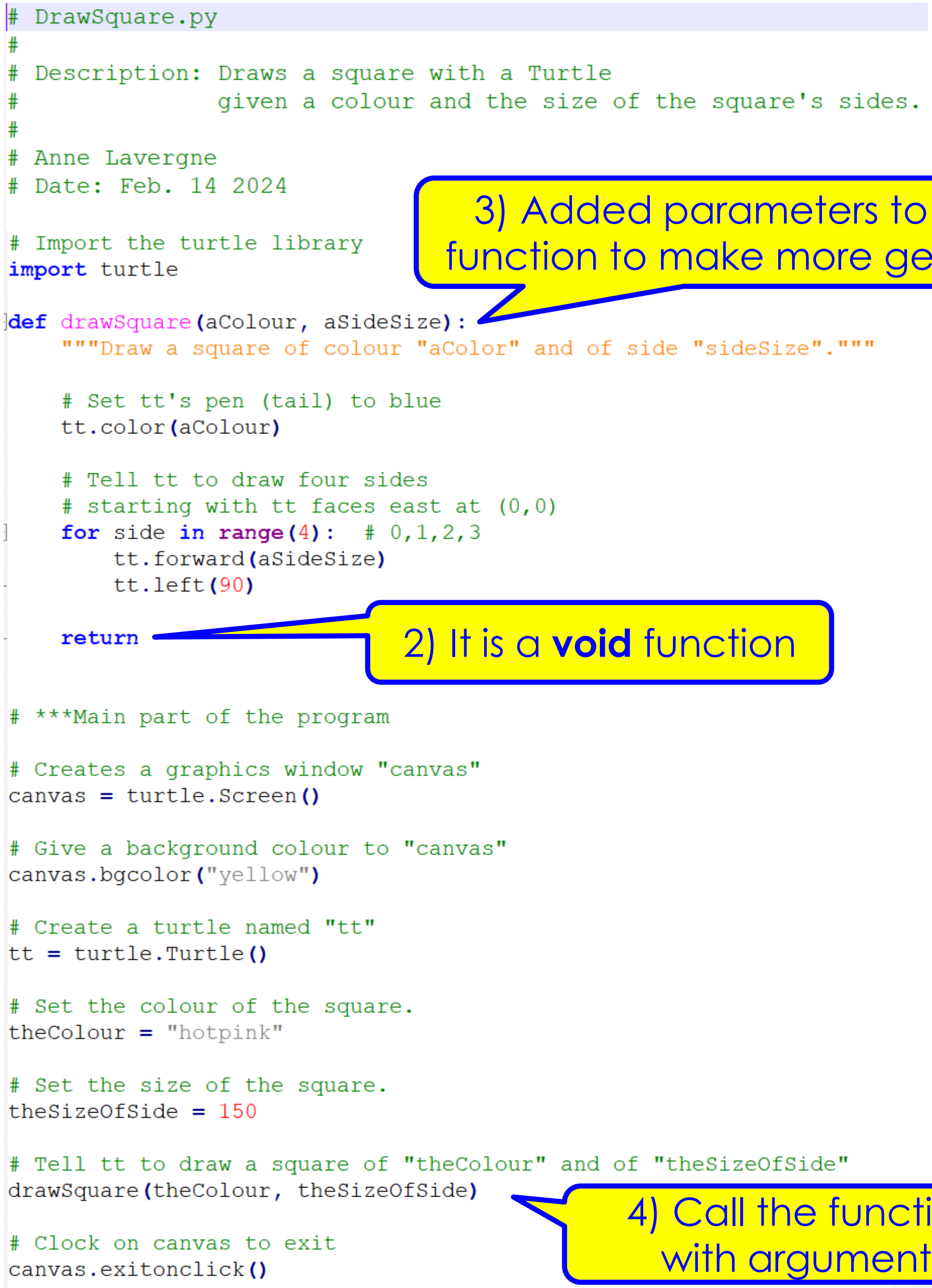
1. How do we create a Turtle object, given the turtle module?
2. What is the keyword necessary to make a `while` loop?
3. What is the keyword necessary to create a function?
4. What is the difference between function parameters and function arguments?
5. Why do we place our functions at the top of our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

Today's Menu

- Continue learning about **turtle**
- Continue creating animation programs using
  - **Turtle**
  - **Functions**
- Introduce **tuples**

Last Lecture

- **Problem Statement:**
  - Write a program that draws a ~~blue~~ square with a **Turtle**



```
# DrawSquare.py
#
# Description: Draws a square with a Turtle
#              given a colour and the size of the square's sides.
#
# Anne Lavergne
# Date: Feb. 14 2024

# Import the turtle library
import turtle

def drawSquare(aColour, aSideSize):
    """Draw a square of colour "aColor" and of side "sideSize"."""

    # Set tt's pen (tail) to blue
    tt.color(aColour)

    # Tell tt to draw four sides
    # starting with tt faces east at (0,0)
    for side in range(4):  # 0,1,2,3
        tt.forward(aSideSize)
        tt.left(90)

    return


# ***Main part of the program

# Creates a graphics window "canvas"
canvas = turtle.Screen()

# Give a background colour to "canvas"
canvas.bgcolor("yellow")

# Create a turtle named "tt"
tt = turtle.Turtle()

# Set the colour of the square.
theColour = "hotpink"

# Set the size of the square.
theSizeOfSide = 150

# Tell tt to draw a square of "theColour" and of "theSizeOfSide"
drawSquare(theColour, theSizeOfSide)

# Clock on canvas to exit
canvas.exitonclick()
```

3) Added parameters to the function to make more general

2) It is a **void** function

4) Call the function with arguments

1) Added **exitonclick()**

How about this!

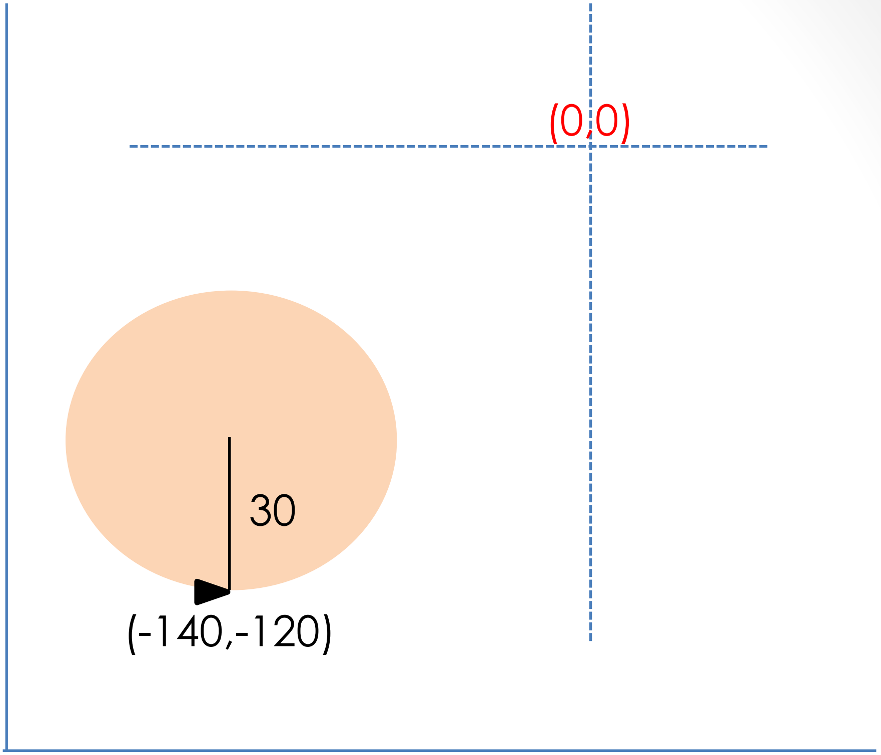
- **Step 1 - Problem statement:**
  - Write a program that draws a chocolate chip cookie with our Turtle
- **Step 2 – Design**
  - Let's create our algorithm
  - As a software developers, we do not need to be told to create a function ☺
  - We know that the functionality of ***drawing a cookie*** needs to be implemented as a function
- **Step 3 – Implementation**
  - Let's transform this algorithm into Python code
- **Step 4 – Testing**
  - Does our program work i.e., solve the problem?

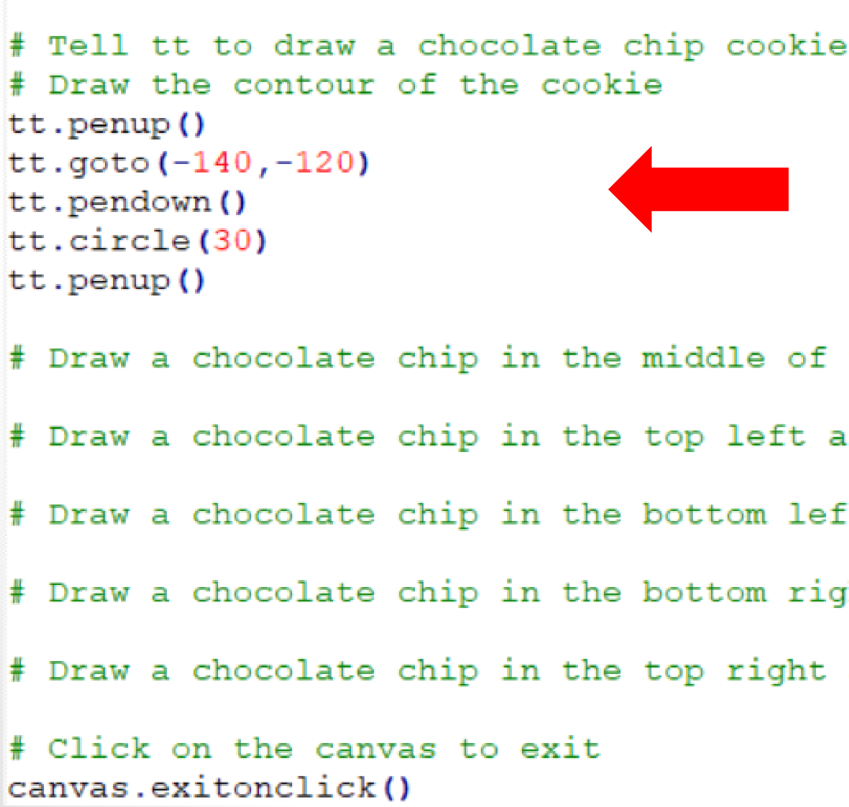
We shall implement our Cookie program **incrementally:** implement some code, test, repeat!

Incremental development: let's draw the cookie first then the chocolate chips! ☺

Step 2 – Design

Turtle Canvas





```
# Tell tt to draw a chocolate chip cookie
# Draw the contour of the cookie
tt.penup()
tt.goto(-140,-120)
tt.pendown()
tt.circle(30)
tt.penup()

# Draw a chocolate chip in the middle of the cookie

# Draw a chocolate chip in the top left area of the cookie

# Draw a chocolate chip in the bottom left area of the cookie

# Draw a chocolate chip in the bottom right area of the cookie

# Draw a chocolate chip in the top right area of the cookie

# Click on the canvas to exit
canvas.exitonclick()
```

What if I want many cookies?

- To solve the “many cookies” problem …
- Call `drawCookie( )` from the ***Main*** *part of my program* using a **for** loop!

What if I want many cookies?

- Hum… calling `drawCookie( )` in a **for** loop from the main part of my program would draw all the cookies in the same spot

- Solution:
  - Add parameters to our `drawCookie( )` function **definition**
  - Use these parameters in the **body** of our `drawCookie( )` function
  - And when we call our `drawCookie( )` function, we pass arguments to it and these arguments can have different values!

What kinds of parameters should we add to our function?

How to draw the chocolate chips?

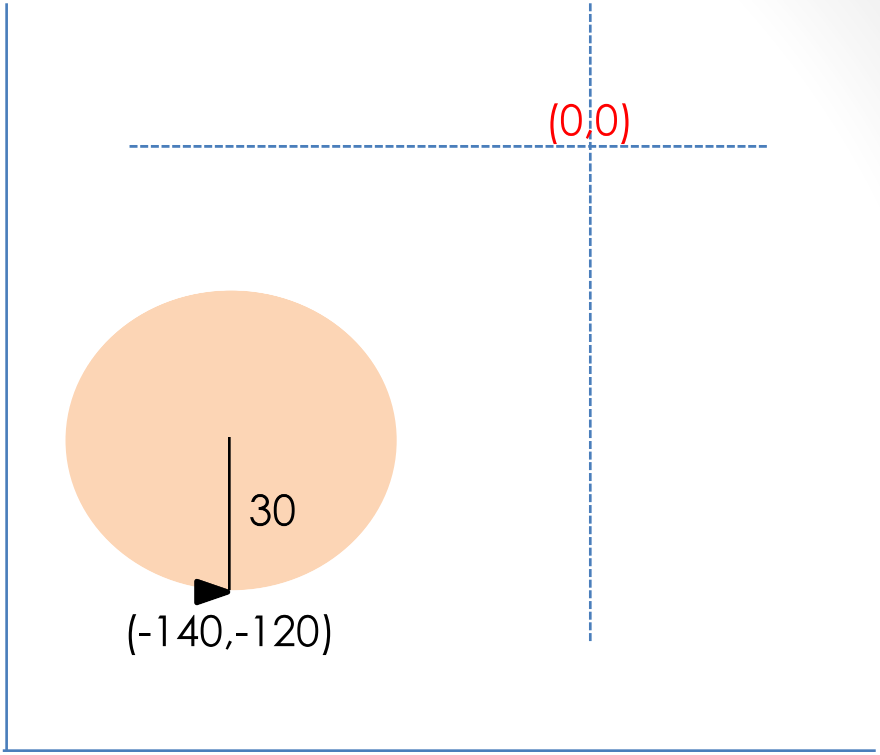
- Solution:
  - Could we copy and modify the code many times, each instance of the code would be drawing a chocolate chip?

- Hum… This solution would lead to a lot of repeating code, which is not a good idea!

Why?

Step 2 – Design

Turtle Canvas



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Next Lecture

- Differentiate
  - variables **local** to a function – local scope

versus

  - variables used outside of a function

- Introduce a new kind of algorithm: **recursion**