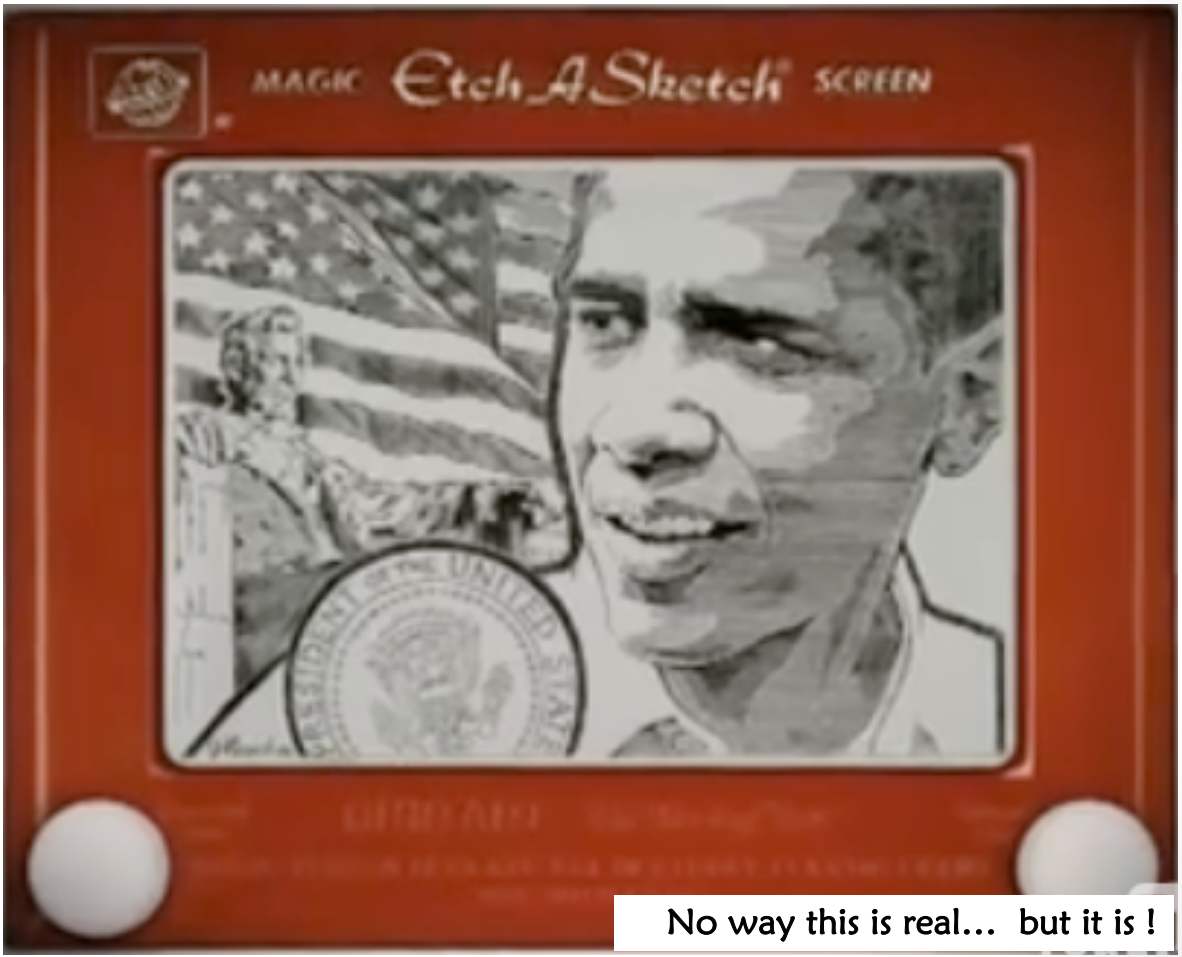
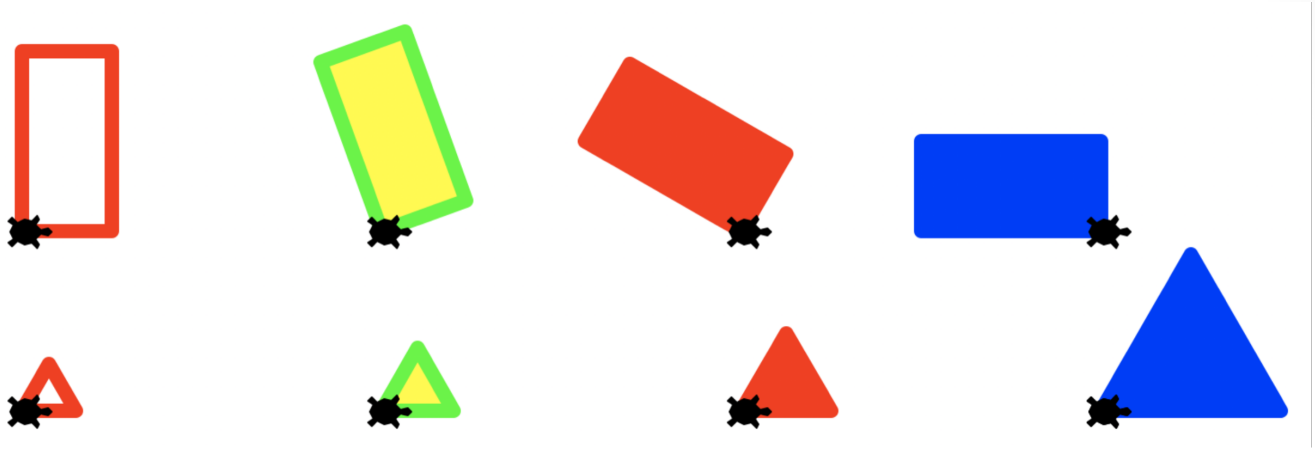
Turtle Graphics Modules

Introduction to Computer Science!

Etch-a-Sketch ?



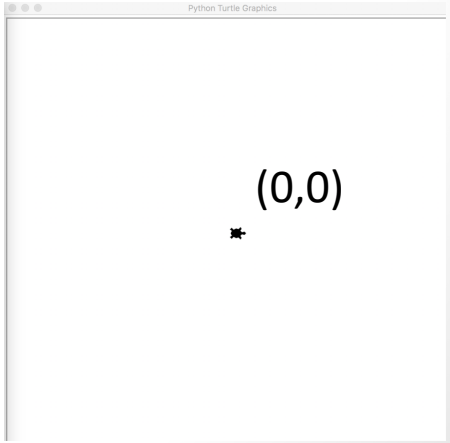
Lab03: Turtle Graphics



```
drawRectangle(t, width, height, tilt, penColor, fillColor)

drawTriangle(t, side, penColor, fillColor)

drawTwoRectangles(t)

drawTwoTriangles(t)
```

Turtle- getting started

```
import turtle
# This statement allows you
to use all the functions in
the turtle package

jane = turtle.Turtle()
# create a new “turtle”
object called jane

jane.shape("turtle")
# change the shape of the
turtle
```



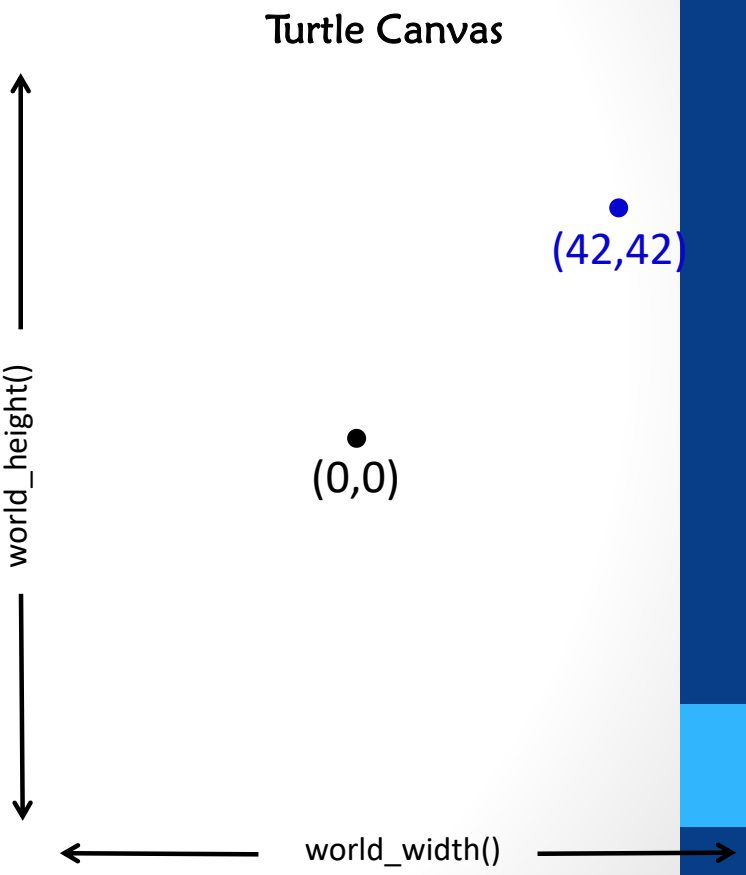
Python's Etch-a-Sketch

```
import turtle
jane = turtle.Turtle()
jane.forward( 100 )
jane.left(60 )
jane.right(90)
jane.width(8)
jane.color("green", "yellow")
jane.up()
jane.forward(50)
jane.down()
```

100 pixels!

degrees!

90 degrees!



ConcepTest

Which order of instructions produces the following output:

Red: Initial position and orientation
Black: Final position and orientation

```
jane.forward(100)   #(1)
jane.left(90)       #(2)
jane.forward(50)    #(3)
jane.right(90)      #(4)
```

- A. (1), (2), (3), (4)
- B. (4), (3), (2), (1)
- C. (1), (4), (2), (3)
- D. (1), (4), (3), (2)

Writing your own module

```
# mycircle.py
# Program that draws multiple circles
import turtle
def fancyCircle(t, radius, penColor, fillColor):
        # Write a function that uses the turtle t
        # to draw a circle with a given radius
        # and color
        return

# Call the function to draw three circles
jane = turtle.Turtle()
fancyCircle(jane, 100, "red", "yellow")
fancyCircle(jane, 50, "red", "red")
```

Writing your own module

```
# happyFace.py
# Uses the mycircle.py as a module
import turtle
import mycircle
def happyFace(t):
        # Use the fancyCircle from mycircle
        # to draw a face, eyes, so on
        # Draw the face
        mycircle.fancyCircle(t, 100, "yellow", "yellow")
        # More code here
        return
# Call the function to draw three circles
jane = turtle.Turtle()
happyFace(jane)
```

import your custom module

To access any function within the mycircle module use the dot operator

Writing your own module

```
# mycircle.py
# Program that draws multiple circles
import turtle
def fancyCircle(t, radius, penColor, fillColor):
        # Write a function that uses the turtle t
        # to draw a circle with a given radius
        # and color
        return
# To run the following lines conditionally, use the
# if __name__=="__main__": clause
if __name__=="__main__":
        jane = turtle.Turtle()
        fancyCircle(jane, 100, "red", "yellow")
        fancyCircle(jane, 50, "red", "red")
```

Conditionally execute this code

__name__ is a variable defined by Python when you run the module mycircle.py

__name__ gets the value __main__ otherwise it's "mycircle"

Loops:
Repetition without being repetitive

Syntax

```
for <item> in <collection>:
    # Code to loop over
    print("Repeat this")
```

Example: Iterating through collections

- Print each character of a string
- Print each element of a list
- Print each element of a tuple

Concept Test

- What is the output of this code?

```
for x in [1, 2, 3]:
    print('Hello'*x) # using x inside the loop
```

A. 1 2 3
B. 'Hello' is printed 3 times
C. Hello
   HelloHello
   HelloHelloHello
D. None of the above

Range( ) function

- Used in a loop when we know the number of times we want to repeat executing some code

```
range(5)      # think of it as producing a list [0, 1, 2, 3, 4]
range(1, 5)# The first parameter is a starting value
              # The second parameter is the stopping value
              # Output [1, 2, 3, 4]
range(0, 10, 2)  # The third parameter is the step count
                    #[0, 2, 4, 6, 8]
```

```
for x in range(5):
    print('Hello')
```

Concept Test

What is the output of this code?

```
for x in range(1,4,2):
    print(2**x, end = " ")
```

A. 1 4 2
B. 2 16 4
C. 2 8 16
D. 2 8
E. None of the above