**Outline**

Develop a better understanding of procedural sequencing by solving shape drawing challenges using the turtle environment.

**Objectives**

* Use correct terminology to describe programming concepts;
* Describe the types of data that computers can process and store (e.g., numbers, text);
* Explain the difference between constants and variables used in programming;
* Use variables, expressions, and assignment statements to store and manipulate numbers and text in a program

**Materials**

* Python3 Development Environment at: https://repl.it/
* PythonWorksheetII form the GitHub Repository
* Web links identified in the questions below

**Level 0: Establishing the Python Turtle Environment**

1. Create an new Repl by selecting the “Python with Turtle” language / environment.
2. Begin all of your turtle programs with the following code to create a “pen”:

import turtle

myPen = turtle.Turtle()

()

1. Create a program to draw a red circle. Provide a listing of your program code below:

import turtle

myPen = turtle.Turtle()

myPen.color()

myPen.color("red")

myPen.circle(100)

**Level 1: Drawing Basic Shapes**

1. Open the document PythonWorksheetII from the class GItHub repository.
2. Create a program to draw any three of the shapes described in “Part III” of the PythonWorksheetII document. Provide a listing of your program code below:

square

**import turtle**

**myPen = turtle.Turtle()**

**myPen.color()**

**myPen.color("red")**

**myPen.forward(100)**

**myPen.right(90)**

**myPen.forward(100)**

**myPen.right(90)**

**myPen.forward(100)**

**myPen.right(90)**

**myPen.forward(100)**

**Level 2: Turtle Challenge 3&4 – Filled Shapes**

1. Review the sample code for creating filled shapes at:   
   <http://www.pythoncode.co.uk/turtle-challenge-3>.

import turtle

myPen = turtle.Turtle()

myPen.forward(120)

myPen.right(60)

myPen.forward(120)

myPen.right(60)

myPen.forward(120)

myPen.right(60)

myPen.forward(120)

myPen.right(60)

myPen.forward(120)

myPen.right(60)

myPen.forward(120)

1. Complete the challenge described at: <http://www.pythoncode.co.uk/turtle-challenge-4>  
   Provide a listing of your program code below:

myPen.forward(100)

myPen.right(90)

myPen.forward(100)

myPen.right(90)

myPen.forward(100)

myPen.right(90)

myPen.forward(100)

myPen.right(90)

myPen.forward(50)

myPen.right(90)

myPen.forward(100)

myPen.right(90)

myPen.forward(50)

myPen.right(90)

myPen.forward(50)

myPen.right(90)

myPen.forward(100)

myPen.right(90)

myPen.forward(50)

myPen.right(90)

myPen.forward(50)

myPen.right(90)

myPen.forward(1)

myPen.left(90)

myPen.forward(1)

myPen.forward(50)

myPen.right(90)

myPen.forward(50)

myPen.right(90)

myPen.forward(3)

myPen.right(90)

myPen.forward(50)

myPen.begin\_fill()

myPen.left(90)

myPen.forward(50)

myPen.left(90)

myPen.forward(50)

myPen.left(90)

myPen.forward(50)

myPen.end\_fill()

**Level 3: Turtle Challenge 5&6 – Spirals**

1. Review the sample code for creating filled shapes at:   
   <http://www.pythoncode.co.uk/turtle-challenge-5>

import turtle

myPen = turtle.Turtle()

myPen.circle(120)

myPen.circle(110,)

myPen.circle(100,)

myPen.circle(90,)

myPen.circle(80,)

myPen.circle(70,)

myPen.circle(60,)

myPen.circle(50,)

myPen.circle(40,)

myPen.circle(30,)

myPen.circle(20,)

myPen.circle(10,)

1. Complete the challenge described at: <http://www.pythoncode.co.uk/turtle-challenge-6>

Provide a listing of your program code below

:import turtle

pen = turtle.Turtle()

pen.speed("fastest")

def spiral (expandSize):

pen.color("black")

lastLine = 0

timer = 0

size = expandSize

while (timer <= 25):

lastLine += 1

pen.left(90)

pen.fd(size)

if (lastLine == 1 or lastLine == 2):

size += 10

elif (lastLine == 3):

size += 10

lastLine = 0

timer += 1

spiral(50)

**Level 4: Four Quadrant Cross Challenge**

1. Complete the challenge described at: <http://www.101computing.net/python-turtle-challenge/>

Provide a listing of your program code below: