

**Sultan Qaboos University**  
**College of Science - Department of Computer Science**  
**COMP2101: Introduction to Computer Science – Spring 2020**  
**Assignment 3**

In this assignment you will work with the turtle object. The purpose of the assignment is for you to explore methods in Python turtle library and use them in the context of computer graphics.

**Task1.** In the first task, you'll modify the following code to repeat the Z shape with a smaller size every time until you get something similar to Zzzz.

The following code draws one Z shape. Run this code to see the shape traced on the screen.

```
import turtle
from turtle import Screen
from time import clock

pen = turtle.Turtle()

pen.forward(50)    # draw a line 50 units long
pen.right(135)     # Rotate clockwise by 135 degrees
pen.forward(70.71) # draw Z diagonal line
pen.left(135)      # Rotate anti-clockwise by 135 degrees
pen.forward(50)
```

To draw the next Z, we need to lift the pen, reposition it at the right angle, then draw the same shape at a smaller scale, as shown next.

```
pen.penup()        # lift pen to move to a new position
pen.forward(20)     # reposition pen to draw the smaller Z
pen.left(90)
pen.forward(30)

pen.pendown()      # put pen down to prepare for drawing
pen.right(90)       # adjust pen angle

pen.forward(30)     # draw a shorter line 30 units long
pen.right(135)      # Rotate clockwise by 135 degrees
pen.forward(42.43)  # draw smaller Z diagonal line
pen.left(135)       # Rotate anti-clockwise by 135 degrees
pen.forward(30)

ts = turtle.Screen()
pen.hideturtle()    #remove arrow shape when done drawing
turtle.done()
```

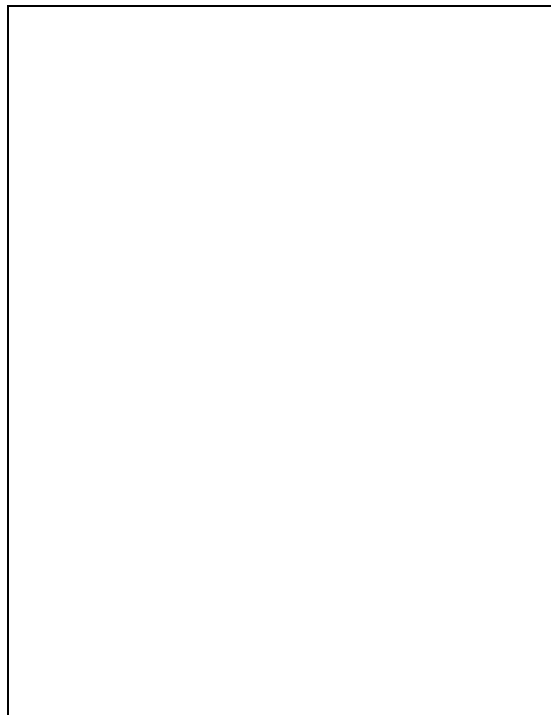
Your first task is to modify this code using a loop to draw the shape Zzzz on the screen. Note that the shape is the same in every iteration. What changes is the **size**. You can use the loop counter to resize the *original shape dimensions* which you should define as *constants*.

**Task2.** The second task is to draw digits of your ID number centered and evenly spaced out on the screen using a pen color chosen by the user. The user should also input the choice of the digit-style to draw. The two options are:

1. **Option 1:** Using right-angled digit shapes (calculator-style) shown in Figure 1 a. below. You may ignore the disconnects and use straight lines.
2. **Option 2:** Using a shape where the number of angles is equal to the digit as shown in Figure 1 b. Use a rounded-shape such as a circle or an oval for 0.



Figure 1. a (top) Digit shapes with straight lines and right angles. b. (below) digit shapes by the number of angles



You should allow the user to continue drawing the ID repeatedly with their choice of digit style and color every time until the ID has been drawn 10 times or the run exceeds 30 seconds.

In either case, a message saying “Thanks for trying out the ID drawing program!” should be displayed before exiting the program. Hint: the library you need to use to time the run is imported in the code provided above.

The following resources are helpful in this assignment:

- [Turtle documentation](#)
- [Turtle online editor](#) (note the two tabs: **result** and **console**)

**Grading Table**

Item	mark
<b>Part(i):</b> program design	/3
<b>Part(ii):</b> Your Python Program	
Style (Comments, indentation)	/1
Use of variables naming (accordance to Python convention)	/1
Reading user options data	/2
Validation of input, and handling invalid options	/2
Output (correct shapes)	/7
Centering and spacing	/2
Repetition: count control	/2
Repetition: time control	/3
Program runs without errors	/1
Proper Naming & Submission	/1
T O T A L	/25