Python Project – Turtles

This coursework project contributes to 5% of the overall coursework marks.

Last Submission Date: 2 May 2021 (11:59pm)
This is an INDIVIDUAL assignment. Your work **must** be your own.

IMPORTANT: Provide detailed documentation of your code.

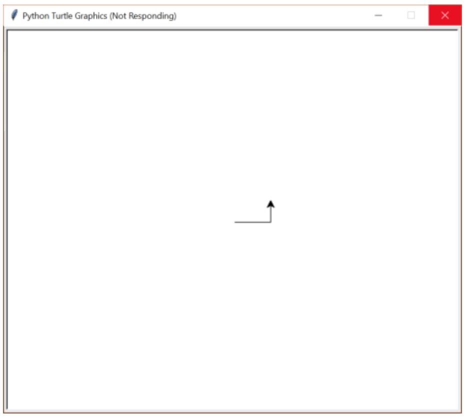
Overview

Turtle graphic was introduced as part of the LOGO programming language in the late 1960's. For over fifty years it had allowed children to draw interesting shapes on their computer. And if they can do it, why not us? Fast forward to the 21st century, the turtle graphics lives on, and has been introduced in Python as a great way to familiarise students to the language. It is a simple and clear graphic programming language, providing a good basis to write functions as part of a program.

The idea behind the turtle graphic is based on a metaphor of a turtle moving around a canvas and drawing as it goes. Imaging a turtle is on a canvas holding a pen. The pen can either be down (touching the canvas) or up (not touching the canvas). When the pen is down, the turtle leaves a trail when it is told to move to a new location. When the pen is up, the turtle moves to a new location without leaving a trail. The colour of the trail leave by the turtle can be changed at any time.

Let's write a simple Python to create a new turtle and start drawing.

```
import turtle                  # Allows us to use turtles
scr = turtle.Screen()           # Creates a playground for turtles
jane= turtle.Turtle()          # Create a turtle, assign to jane
jane.forward(50)               # Tell jane to move forward by 50 units
jane.left(90)                  # Tell jane to turn by 90 degrees
jane.forward(30)               # Complete the second side of a rectangle
scr.mainloop()                  # Wait for user to close window
```



This project will familiarize you with what you've learned throughout the past few weeks. We will be using the Turtle graphic library, and have some fun in the process.

Part 1: Basic Functions

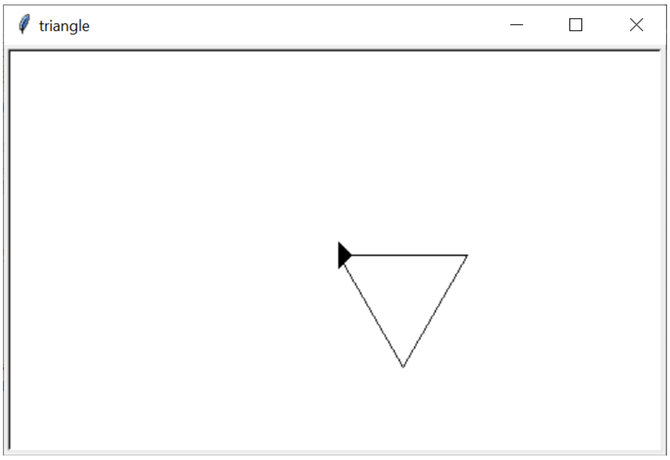
1. Now that we know how turtle 'works', let's start by creating a function named **make_window()** to set up the window (i.e. canvas) with a given title. Default parameters: background colour = white, window's width = 800 and window's height = 600.
2. Create a function named **make_turtle()** to set up a turtle. Default parameters: shape = 'arrow', colour = 'black' and pen size = 1.
3. Create a **main()** function. Start the program by prompting user to select the desired type of shapes (i.e. triangle, star, multicolour star, spiral, dotted spiral) they wish to view.

*Feel free to add more basic functions to personalize your program. Make sure to provide proper justification for the need of the new functions.

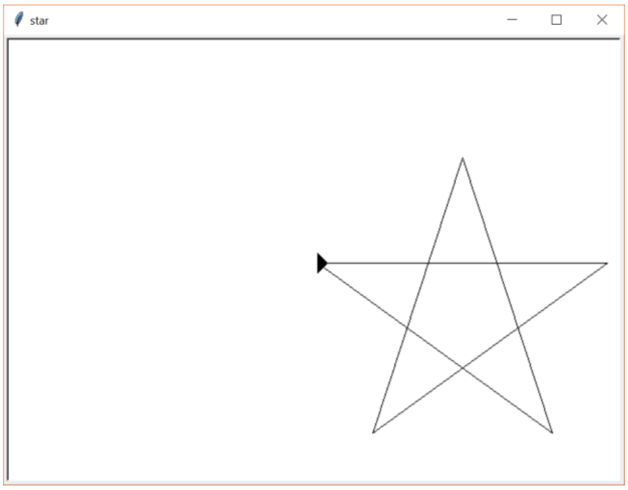
Part 2: Drawing Functions

Define functions to draw the following shapes using the functions you have defined in **Part 1**.

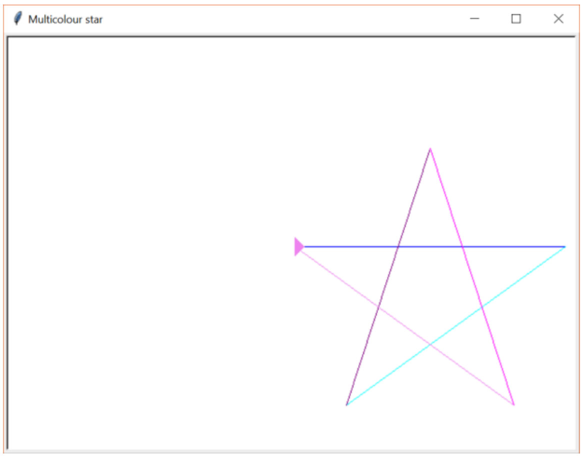
4. Draw an equilateral triangle. When the turtle stops, it should be pointing east. Your drawing should look like the figure below.



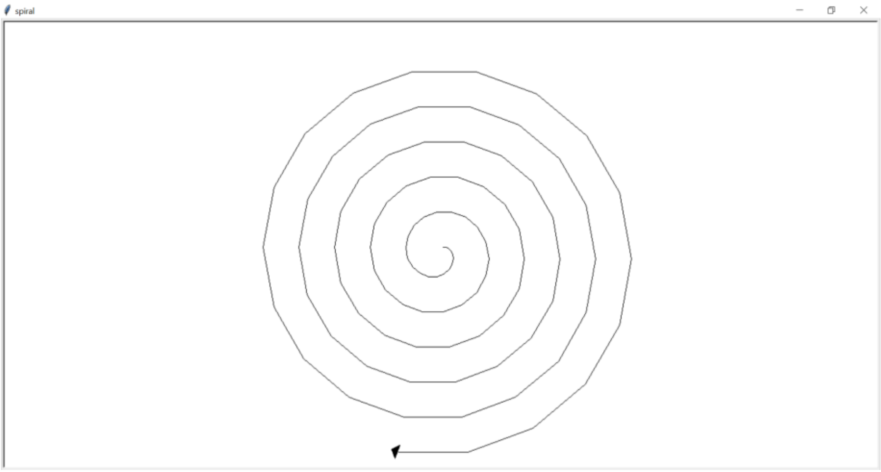
5. Draw a star (without loop). Your drawing should look like the figure below.



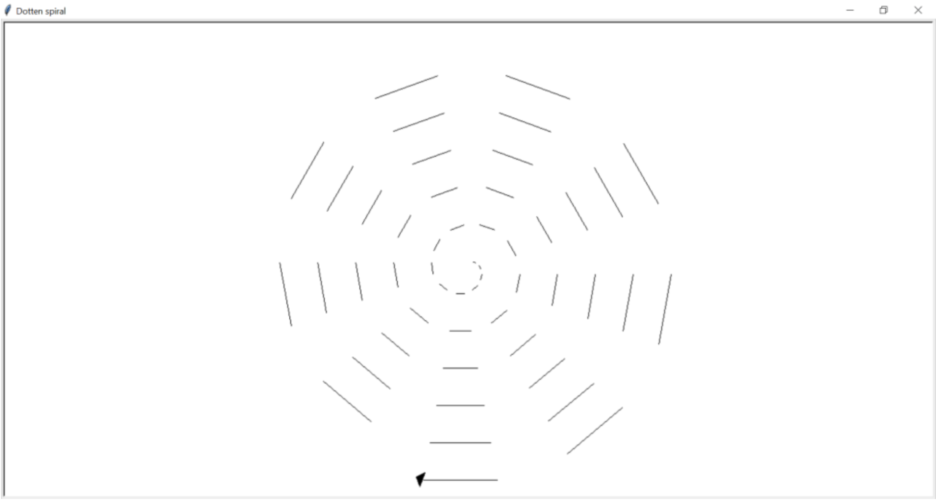
6. Now try enhancing the code to redraw the star using different colour for each line.



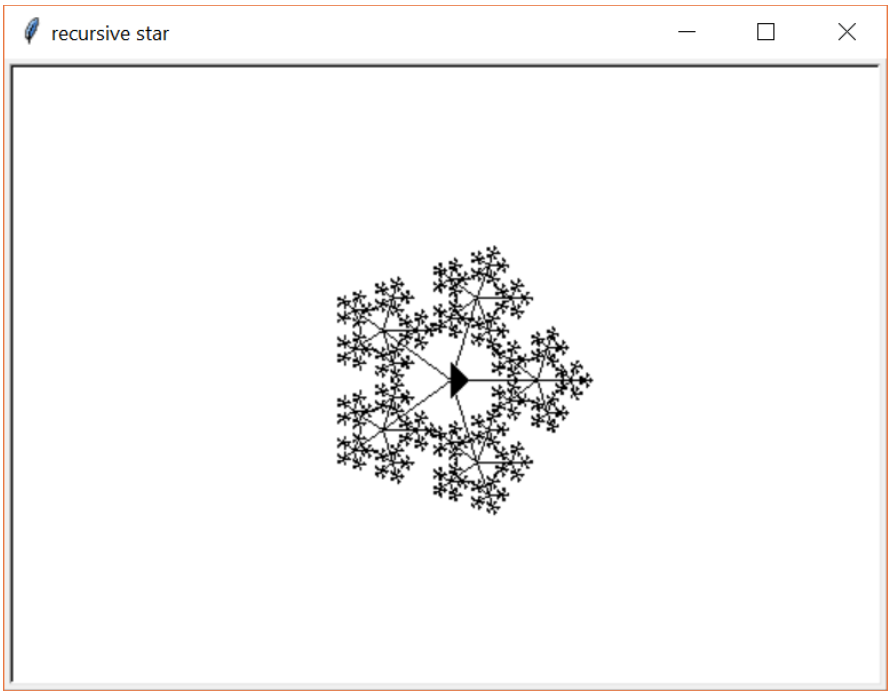
7. Using what you have learned when drawing a star, now draw a spiral (clockwise).



8. Redraw the spiral using dotted line.



9. Completed everything already?
   Using what you are learned so far, draw a snowflake using recursion.
   *Only attempt to solve this problem if you have finished the rest of the previous questions.



Documentation: (Marks will be given based on your documentation)

1. Include docstring documentation for all the functions.

2. Provide comments in your code. Keep the comments brief and focused.

Reminder:

This is an **INDIVIDUAL** work. Your work must be completed by you and you alone. The first instance of plagiarism will results in '**ZERO**' on this project.

If any part of your submitted work was taken as it is or altered from another student or materials from another source (including online solutions), it is considered as plagiarism. Plagiarism also includes allowing your peers to alter or revise your submitted work as their own.

Written by Kok Ven Jyn 2017 (rev. 2021 March)