Lab 1

COMP9021, Session 1, 2015

Create two sequences of directories,

- `~/COMP9021/Labs` and
- `~/COMP9021/Lectures`.

One way to do this is to, in your home directory, execute the Unix command

```
mkdir -p COMP9021/Labs COMP9021/Lectures
```

Download from the course's website the compressed archives

- `Lab_1.tar.gz` and
- `Lecture_1.tar.gz`,

and save them in the appropriate directories. Decompress the archives. One way to do this is to, in the directory `~/COMP9021/Labs`, execute the Unix command

```
tar xzf Lab_1.tar.gz
```

and in the directory `~/COMP9021/Lectures`, execute the Unix command

```
tar xzf Lecture_1.tar.gz
```

This will create a subdirectory `Lab_1` of `~/COMP9021/Labs` and a subdirectory `Lecture_1` of `~/COMP9021/Lectures`, each of which will contain the provided material. The archives can then be deleted. One way to do this is, in the directory `~/COMP9021`, execute the Unix command

```
rm Labs/*gz Lectures/*gz
```

You will do the same for the following labs and lectures; recall then to refer to these instructions if needed.

1 Running python code

Experiment with the different ways of running python code as described in the pdf document `Running python code.pdf`, which is part of the material for the first lecture.

2 Text-based programs

2.1 Arithmetic computations

Run and study the program `fahrenheit_to_celsius.py`.

Then write a program `celsius_to_fahrenheit.py` that displays a conversion table from Celsius degrees to Fahrenheit degrees, with the former ranging from 0 to 100 in steps of 10.

2.2 Lists

Run and study the program `max_in_list.py`.

Then write a program `largest_difference.py` that generates a list of 10 random integers between -50 and 50 (included), prints out the list, computes the maximum difference between 2 successive elements in the list, and prints it out. Here is a possible interaction:

```
$ python largest_difference.py
The list is: [29, -18, -21, -46, 32, -46, -10, -19, 31, 40]
The maximum difference between successive numbers in this list is: 78
$ python largest_difference.py
The list is: [-17, -45, -28, -25, -48, 4, 29, -43, -1, 40]
The maximum difference between successive numbers in this list is: 52
$ python largest_difference.py
The list is: [20, -16, 20, -44, 41, 31, 32, -2, -15, -40]
The maximum difference between successive numbers in this list is: 85
```

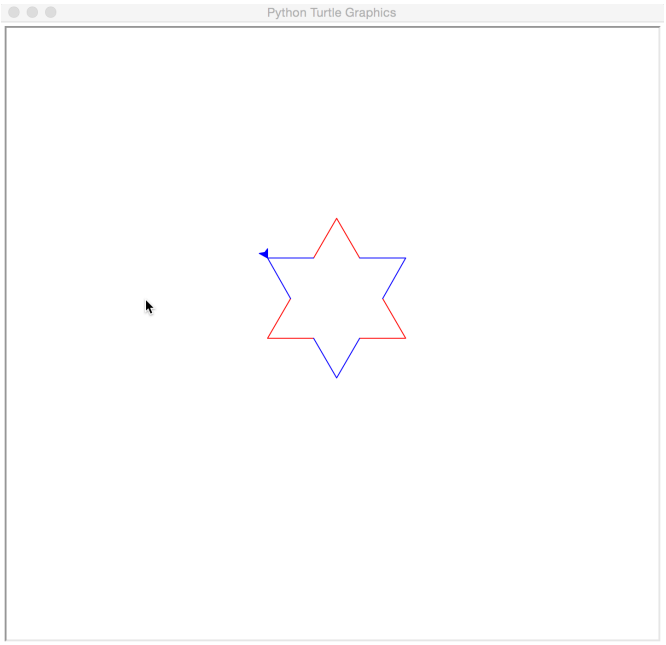
3 Drawing pictures with `turtle`

For the following exercises, you can refer to the Turtle graphics documentation, but you can complete the exercises by just studying the sample programs.

3.1 An hexagram

Run and study the program `dodecagrams.py`.

Then write a program `hexagram.py` that draws an hexagram that is centred horizontally in the window that displays it, with the colour of the tips alternating red and blue:

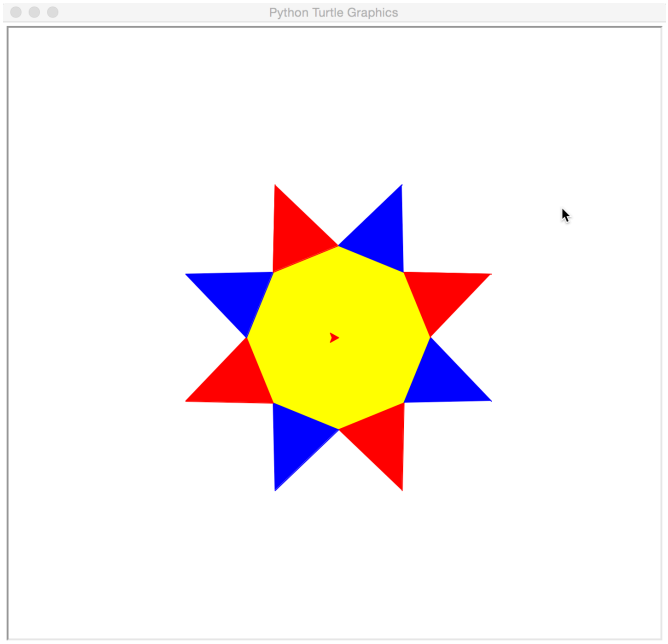


You are encouraged to draw the red part and then the blue part of the star.

3.2 An octagram

Run and study the program `dodecagon.py`.

Then write a program `octagram.py` that draws an octagram, the inscribed octagon being coloured yellow, and the colour of the triangles alternating red and blue:



You can set the distance from the centre to an edge of the inscribed octagon to 100 pixels, and the distance from the centre to the tip of a triangle to 180 pixels.