

Lab 1

COMP9021, Session 2, 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, in absolute value, between 2 successive elements in the list, and prints it out. Here is a possible interaction:

```
$ python3 largest_difference.py
The list is: [1, -15, 30, -35, -15, -42, -16, -43, 4, -29]
The maximum difference between successive numbers in this list is: 65
$ python3 largest_difference.py
The list is: [21, -23, 25, -15, 48, 30, 6, -47, 8, 33]
The maximum difference between successive numbers in this list is: 63
$ python3 largest_difference.py
The list is: [-22, 9, 5, 33, 29, 26, -42, 7, 39, 3]
The maximum difference between successive numbers in this list is: 68
```

To compute the absolute value of a number `x`, you can use `abs(x)`; *e.g.*, both `abs(2)` and `abs(-2)` evaluate to 2.

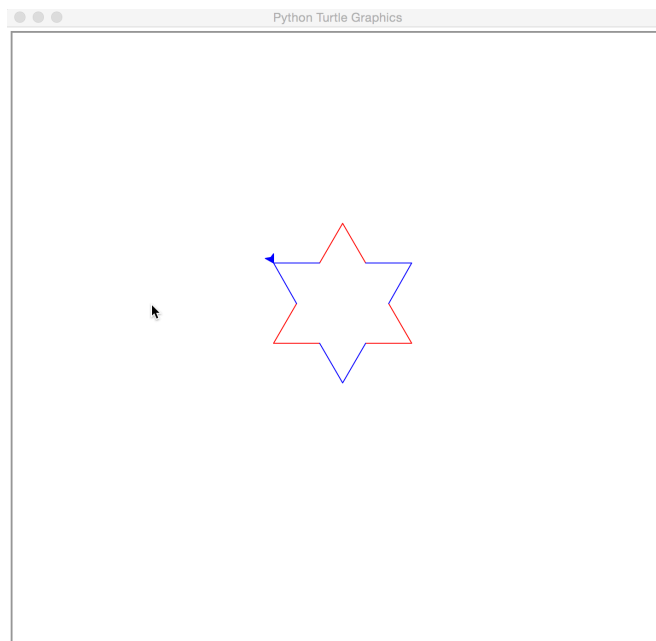
3 Drawing pictures with turtle

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:

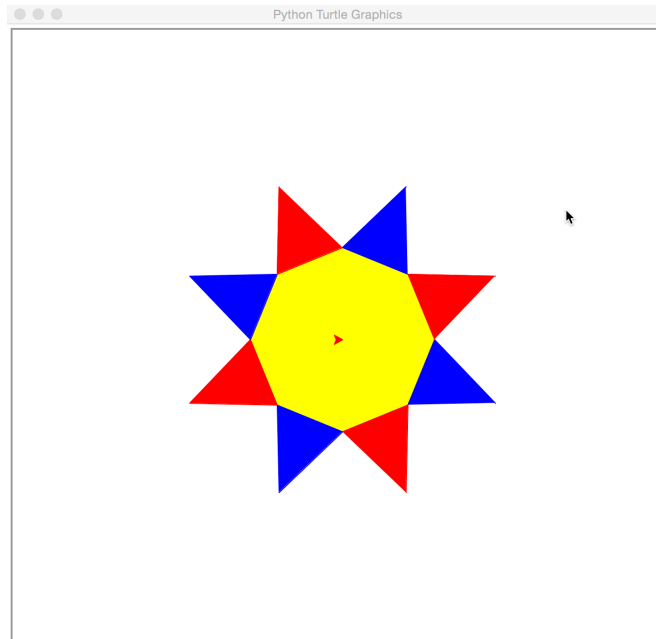


You are encouraged to draw the red part and then the blue part of the star.

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.