# ECMM455 Python Worksheet 17: Simple plotting with *matplotlib*

Prof Hywel Williams

September 12, 2019

## 1 Aims

- Try some simple plotting using the *matplotlib* package for Python

## 2 Visualisation with *matplotlib*

The Python module called *matplotlib.pyplot* provides a large number of useful functions for plotting graphs and other data visualisation tasks. Documentation for *matplotlib.pyplot* can be found here: *http://matplotlib.org/* . The *matplotlib.pyplot* module can be imported using the command *import matplotlib.pyplot* .

## 3 Exercise: Plot a simple line graph

### 3.1 Some real data

A classic example of an epidemic reported in *Mathematical Biology* by J.D. Murray (Springer-Verlag, 1989) is an outbreak of influenza at an English boarding school in January 1978. In total there were 763 boys at the school, of whom one returned from Christmas break with flu. The table below shows the number of boys infected over the course of the subsequent 14-day outbreak.

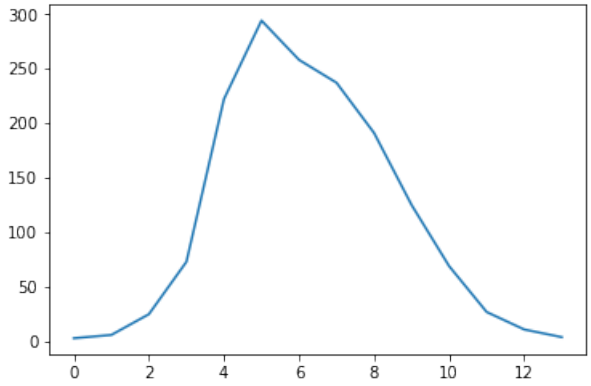
| day | #infected |
|---|---|
| 1 | 3 |
| 2 | 6 |
| 3 | 25 |
| 4 | 73 |
| 5 | 222 |
| 6 | 294 |
| 7 | 258 |
| 8 | 237 |
| 9 | 191 |
| 10 | 125 |
| 11 | 69 |
| 12 | 27 |
| 13 | 11 |
| 14 | 4 |

## 3.2 A first plot

Follow these steps:

- Begin a new Python program.
- Import the *matplotlib.pyplot* module
  - Hint: use the *import a as b* form to give it a manageable name! Put the import statement at the top of your program file - this convention makes it easy to see what modules a program uses.
- Create two lists called *days* and *infected* and populate them with the relevant values from the table above.
- Use the *plot()* function from that module to draw a line plot of the data in *infected*, e.g., *plt.plot(infected)* .
- Use the *show()* function from that module to cause the plot to be displayed (e.g. *plt.show()* ). If you do not do this then the graph object will be created in memory but not shown on the screen.

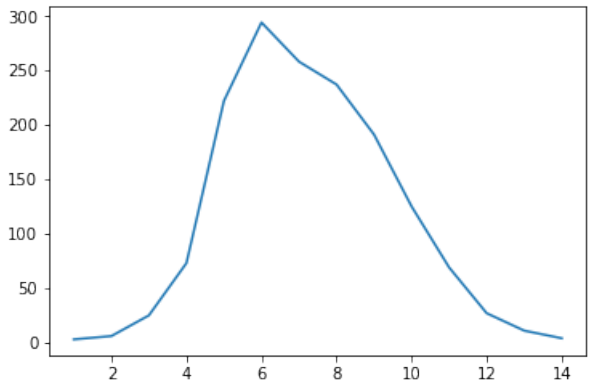
Debug and run your code. You should see a graph similar to this:




## 3.3 Handling time properly

The code currently plots *infected* against the index of each value. We actually want to plot *infected* against *days*. To do this, alter your call to the *plot()* function so that it plots *infected* against *days*. (Hint: Look at the documentation for *matplotlib* to find out how to do this.)

Debug and run your code. You should have a graph that looks similar to this:



## 3.4 Adding some labels

Every graph should have axes labels. A title is also useful. These can be added using the *title(), xlabel(), ylabel()* functions from the *matplotlib.pyplot* module. Look at the documentation to find out how to use these functions. You should end up with something looking a bit like this: