CMPT 423/820

Assignment 1 Question 5

- Your Name
- Your student number
- Your NSID

In this question, some basic work with MatPlotLib.

```
In [1]:  # this is the conventional import
         import numpy as np
         import matplotlib.pyplot as plt
```
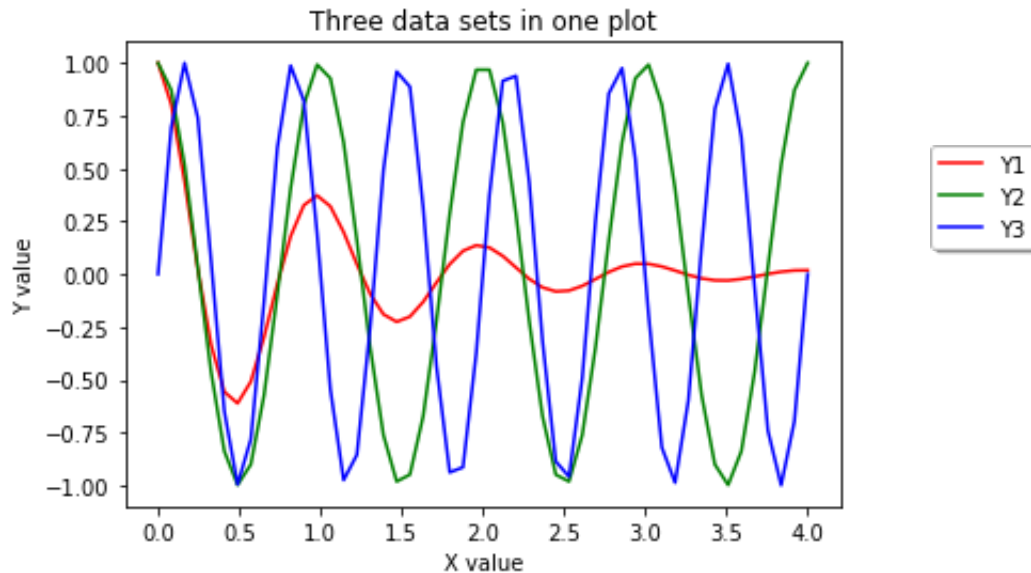
Data sets

In the cell below, three data sets are generated using Numpy. Make sure you understand what the code is doing!

```
In [2]:  # x-coordinates
         xs = np.linspace(0.0, 4.0)

         # 3 sets of y-coordinates
         y1 = np.cos(2 * np.pi * xs) * np.exp(-xs)
         y2 = np.cos(2 * np.pi * xs)
         y3 = np.sin(3 * np.pi * xs)
```

Task 1

Plot the three data sets (xs vs y1 , xs vs y2 , xs vs y3) on the same set of axes. Make the plot look good, choosing colours, giving labels for horizontal and vertical axes, and a title. Add a legend. Marks will be deducted for careless presentation.

```
In [3]: plt.plot(xs, y1, 'r')
        plt.plot(xs, y2, 'g')
        plt.plot(xs, y3, 'b')
        plt.xlabel('X value')
        plt.ylabel("Y value")
        plt.title('Three data sets in one plot')
        plt.legend(['Y1', 'Y2', 'Y3'], loc='upper center', bbox_to_anchor=(1.2
        , 0.8), shadow=True, ncol=1)
        plt.show()
```


Task 2

Plot the three data sets (xs vs y1 , xs vs y2 , xs vs y3) on three independent axes, **horizontally** arranged. Make the plots look good, choosing colours, giving labels for horizontal and vertical axes, and a title. Marks will be deducted for careless presentation.
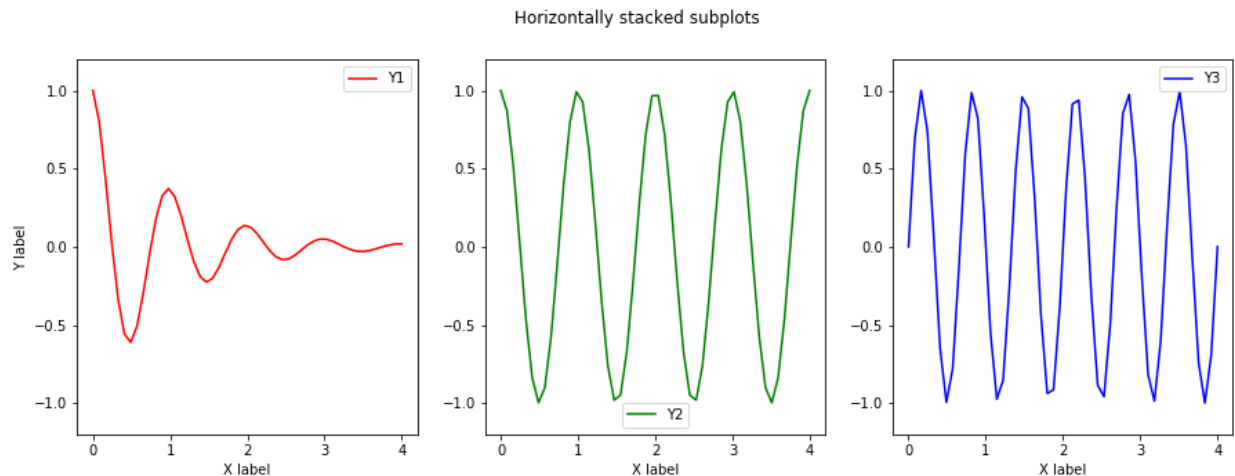
```
In [4]:  fig, (ax1, ax2, ax3) = plt.subplots(1, 3, figsize=(15,5))
         fig.suptitle('Horizontally stacked subplots')

         ax1.plot(xs, y1,'r')
         ax1.set(xlabel='X label')
         ax1.set(ylabel='Y label')
         ax1.set_ylim(-1.2,1.2)
         ax1.legend(['Y1'])

         ax2.plot(xs, y2,'g')
         ax2.set(xlabel='X label')
         ax2.set_ylim(-1.2,1.2)
         ax2.legend(['Y2'])

         ax3.plot(xs, y3,'b')
         ax3.set(xlabel='X label')
         ax3.set_ylim(-1.2,1.2)
         ax3.legend(['Y3'])

         plt.show()
```


Task 3

Plot the three data sets (xs vs y1 , xs vs y2 , xs vs y3) on three independent axes, **vertically** arranged. Make the plots look good, choosing colours, giving labels for horizontal and vertical axes, and a title. Marks will be deducted for careless presentation.

```
In [5]:  fig, (ax1, ax2, ax3) = plt.subplots(3, figsize=(5,15))
         fig.suptitle('Horizontally stacked subplots')

         ax1.plot(xs, y1,'r')
         ax1.set(xlabel='X label')
         ax1.set(ylabel='Y label')
         ax1.set_ylim(-1.2,1.2)
         ax1.legend(['Y1'])

         ax2.plot(xs, y2,'g')
         ax2.set(xlabel='X label')
         ax2.set(ylabel='Y label')
         ax2.set_ylim(-1.2,1.2)
         ax2.legend(['Y2'])

         ax3.plot(xs, y3,'b')
         ax3.set(xlabel='X label')
         ax3.set(ylabel='Y label')
         ax3.set_ylim(-1.2,1.2)
         ax3.legend(['Y3'])

         plt.show()
```
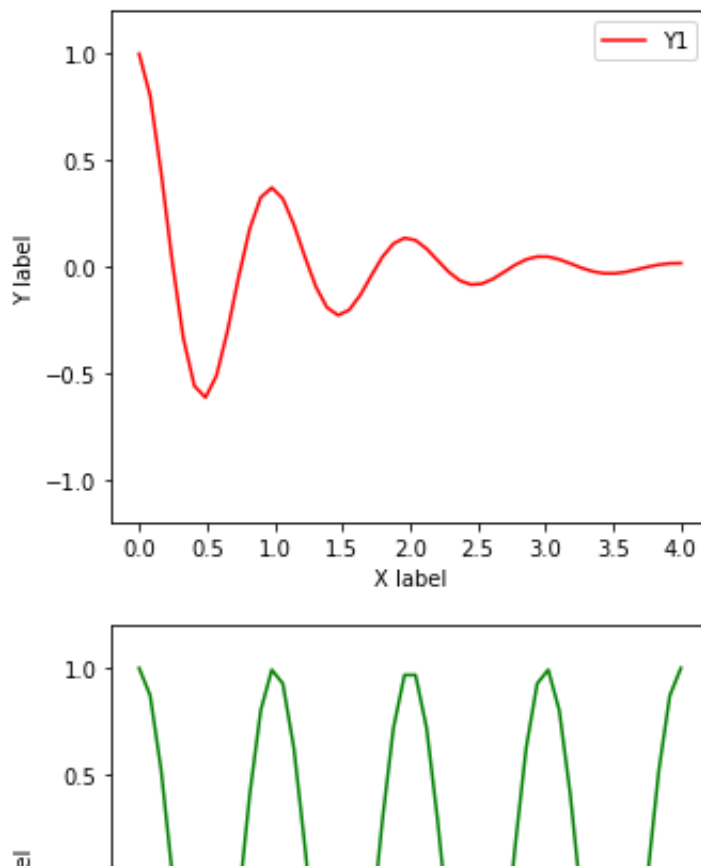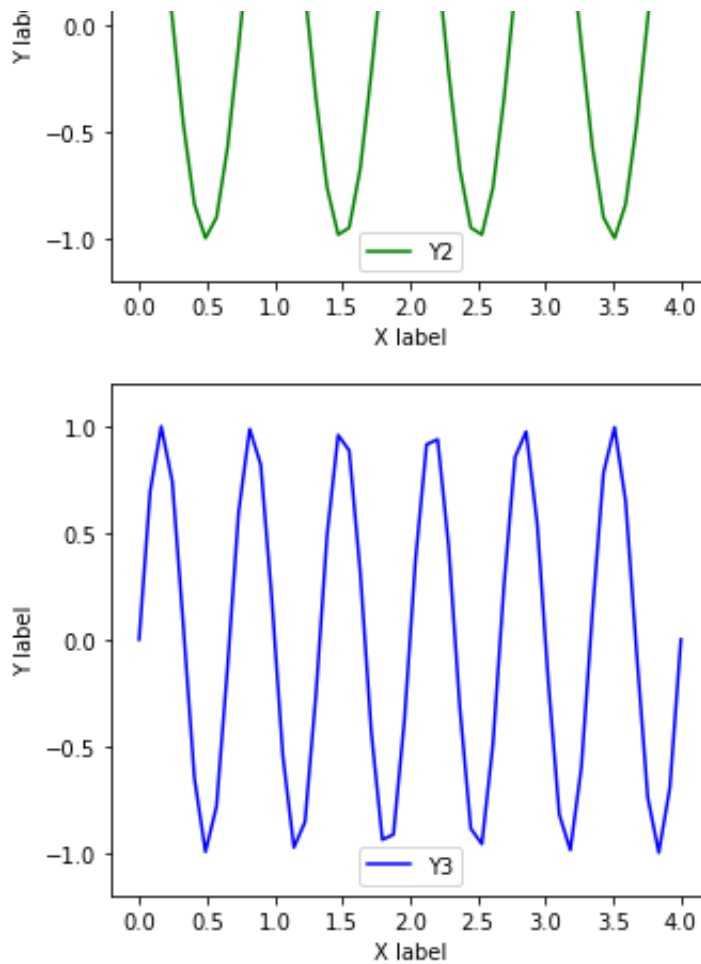
Horizontally stacked subplots

What to hand in

Your version of this notebook named A1Q5.pdf, containing completed work above, and your name and student number at the top.

Evaluation:

- 3 marks: Your plot for task 1 shows the 3 data sets on a single set of axes. The plot has labels, a title, and a legend.
- 3 marks: Your plot for task 2 shows the 3 data sets on individual axes arranged horizontally. The plots have labels, and there is a title. It looks good.
- 3 marks: Your plot for task 3 shows the 3 data sets on individual axes arranged vertically. The plots have labels, and there is a title. It looks good.

Grading:

- Task 1: 3 marks
    - Required: 3 data sets on a single set of axes.
    - Required: The plot has labels, a title, and a legend.
    - Optional: Placement of the legend is finnicky.
    - Optional: Colours, label strings, legend strings.
    - Optional: Getting to the size takes some Googling.
- Task 2: 3 marks:
    - Required: 3 data plots horizontally.
    - Required: The plot has labels, a title, and a legend.
    - Optional: Placement of the legend is finnicky.
    - Optional: Colours, label strings, legend strings.
    - Optional: Getting to the size takes some Googling.
- Task 3: 3 marks:
    - Required: 3 data plots vertically.
    - Required: The plot has labels, a title, and a legend.
    - Optional: Placement of the legend is finnicky.
    - Optional: Colours, label strings, legend strings.
    - Optional: Getting to the size takes some Googling.
- Deductions:
    - 3 mark deduction if all plots are missing all titles, labels, legends, etc.