

Part 1

a. Initialize a 2X2 numpy array with random values. Name this array as 'x'

```
In [10]: import numpy as np  
x = np.array([[1,2],[3,4]])
```

b. Display the contents of the x

```
In [11]: x
```

```
Out[11]: array([[1, 2],  
               [3, 4]])
```

c. Display the type of the x

```
In [12]: type(x)
```

```
Out[12]: numpy.ndarray
```

d. Display the size of the x

```
In [13]: x.size
```

```
Out[13]: 4
```

e. Display the data type of the array elements in x

```
In [15]: x.dtype
```

```
Out[15]: dtype('int64')
```

f. Force the data in the x to be converted to float type and display the elements

```
In [16]: x = np.array([[1,2],[3,4]], dtype=float)
```

```
In [17]: x
```

```
Out[17]: array([[ 1.,  2.],
                [ 3.,  4.]])
```

g. Create a new array 'y' and store the transpose of the above created 2X2 array(i.e. transpose of x)

```
In [9]: y = np.transpose(x)
y
```

```
Out[9]: array([[ 1.,  3.],
               [ 2.,  4.]])
```

h. Do a matrix addition "x+y" and store it as a new array "a" and display the contents of a

```
In [19]: a = x+y
```

```
In [20]: a
```

```
Out[20]: array([[ 2.,  5.],
                [ 5.,  8.]])
```

i. Do a matrix multiplication "x*y" and store it as a new array "b" and display the contents of b

```
In [21]: b = np.dot(x,y)
```

```
In [22]: b
```

```
Out[22]: array([[ 5., 11.],
                [11., 25.]])
```

Part 2

a. Use subplot function to plot the following functions:

$$y = \sin(x)$$

$$y = \cos(x)$$

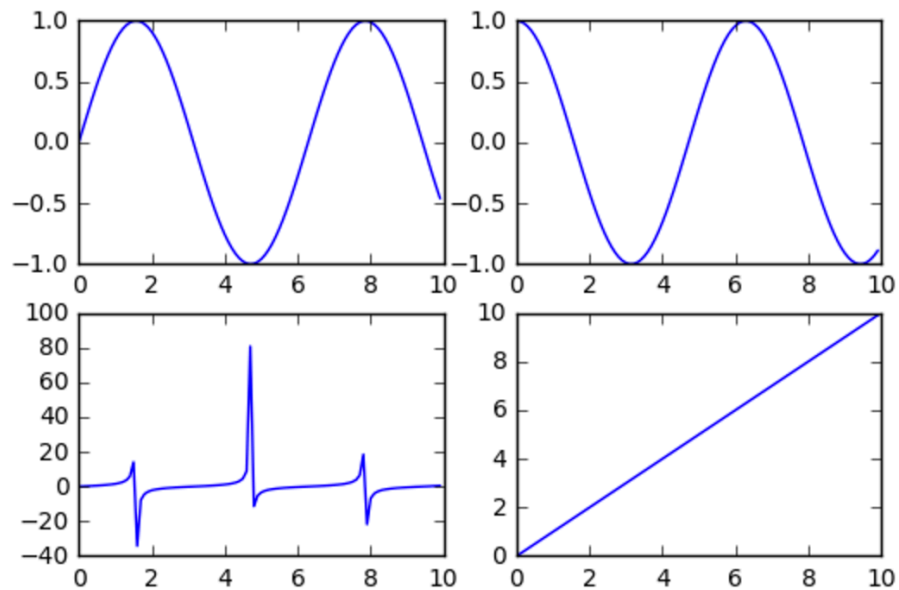
$$y = \tan(x)$$

$$y = x$$

```
In [40]: import matplotlib.pyplot as plt
%matplotlib inline
x = np.arange(0, 10, 0.1)
y = np.sin(x)
z = np.cos(x)
w = np.tan(x)
```

```
In [41]: plt.subplot(2,2,1)
plt.plot(x,y)
plt.subplot(2,2,2)
plt.plot(x,z)
plt.subplot(2,2,3)
plt.plot(x,w)
plt.subplot(2,2,4)
plt.plot(x,x)
```

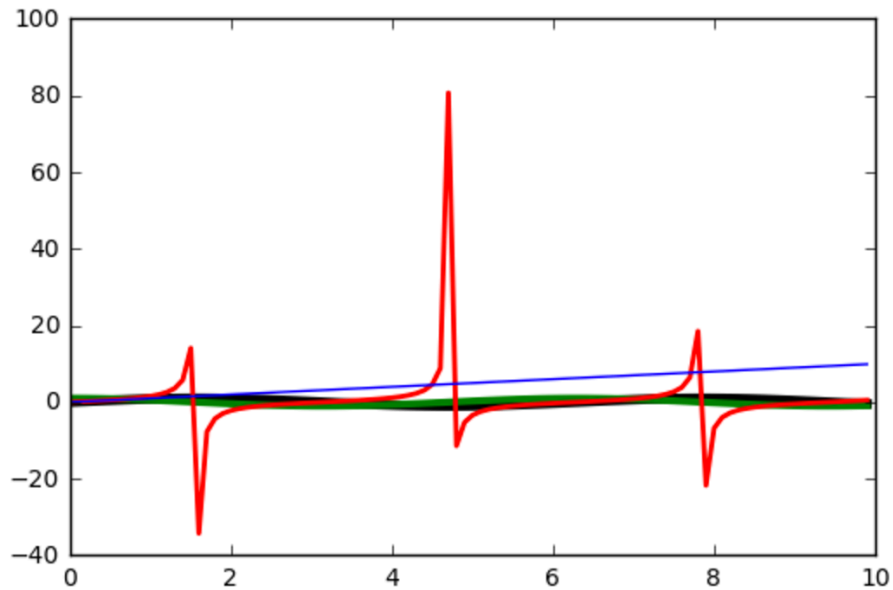
Out[41]: [<matplotlib.lines.Line2D at 0x11086b8d0>]



b. Plot the graphs for the above mentioned functions on the same figure using hold function. Assign different colour, thickness and linewidth for the different functions.

```
In [42]: plt.hold(True)
plt.plot(x, y, 'k', linewidth='4')
plt.plot(x, z, 'g', linewidth='3')
plt.plot(x, w, 'r', linewidth='2')
plt.plot(x, x, 'b', linewidth='1')
```

```
Out[42]: [<matplotlib.lines.Line2D at 0x110b58110>]
```



c. Download the monthly_temp_data.csv sheet attached with the homework. Import the above csv file using csv.reader

```
In [82]: import csv
with open("temp.csv", "r") as f:
    reader = csv.reader(f)
    dat = [row for row in reader]
```

Read the file as a list

```
In [12]: type(dat)
```

```
Out[12]: list
```

```
In [83]: dat
```

```
Out[83]: [['Date', 'Temp'],  
          ['1', '25'],  
          ['2', '0'],  
          ['3', '-16'],  
          ['4', '5'],  
          ['5', '11'],  
          ['6', '-6'],  
          ['7', '42'],  
          ['8', '-2'],  
          ['9', '-13'],  
          ['10', '14'],  
          ['11', '4'],  
          ['12', '-22'],  
          ['13', '19'],  
          ['14', '6'],  
          ['18', '-6'],  
          ['19', '-25'],  
          ['20', '-23'],  
          ['21', '-28'],  
          ['22', '-22'],  
          ['23', '-22'],  
          ['24', '-10'],  
          ['25', '-20'],  
          ['26', '-24'],  
          ['27', '-24'],  
          ['28', '-22'],  
          ['29', '-23'],  
          ['30', '-19'],  
          ['31', '-2']]
```

Store the values for temperature column and day in separate lists(remember to remove the headers)

```
In [14]: date = [dat[i][0]for i in range(1,len(dat)-1)]  
temp = [dat[i][1]for i in range(1,len(dat)-1)]
```

In [15]: date

Out[15]: ['1',
'2',
'3',
'4',
'5',
'6',
'7',
'8',
'9',
'10',
'11',
'12',
'13',
'14',
'18',
'19',
'20',
'21',
'22',
'23',
'24',
'25',
'26',
'27',
'28',
'29',
'30']

In [16]: temp

```
Out[16]: ['25',  
          '0',  
          '-16',  
          '5',  
          '11',  
          '-6',  
          '42',  
          '-2',  
          '-13',  
          '14',  
          '4',  
          '-22',  
          '19',  
          '6',  
          '-6',  
          '-25',  
          '-23',  
          '-28',  
          '-22',  
          '-22',  
          '-10',  
          '-20',  
          '-24',  
          '-24',  
          '-22',  
          '-23',  
          '-19']
```

Plot the graph for Date vs. Temperature with title for the plot as “Day vs. Temperature”, xlabel as Date and ylabel as Temperature

```
In [98]: plt.plot(date,temp)
plt.title("Date vs. Temperature")
plt.xlabel("Date")
plt.ylabel("Temperature")
```

```
Out[98]: <matplotlib.text.Text at 0x11129a150>
```

