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:

$y = \sin(x)$
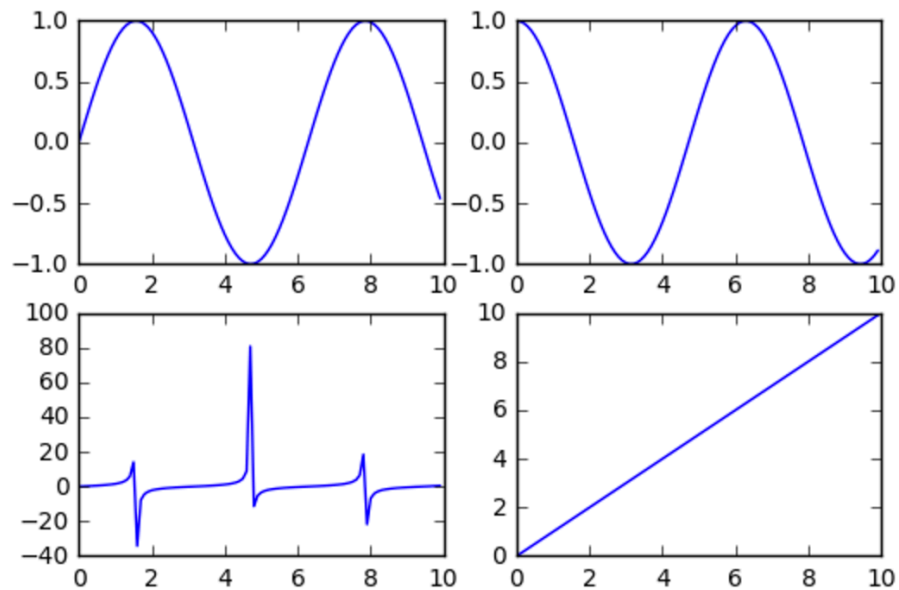
$y = \cos(x)$

$y = \tan(x)$

$y = x$

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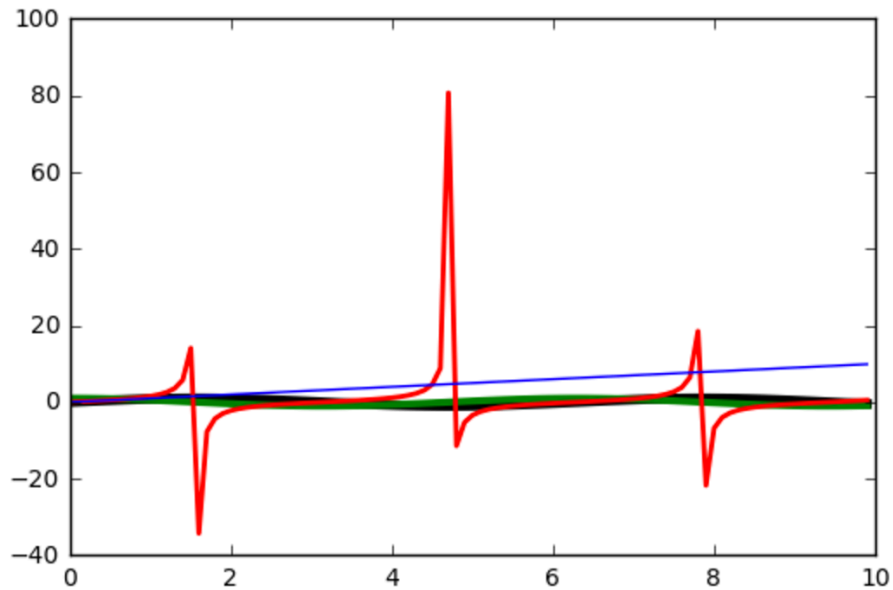
Out[41]: [<matplotlib.lines.Line2D at 0x11086b8d0>]

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

```
In [12]: date
```

```
Out[12]: ['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',
          '31']
```

```
In [13]: temp

Out[13]: ['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',
         '-2']
```

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

```
In [16]: plt.plot(date,temp)
         plt.title("Date vs. Temperature")
         plt.xlabel("Date")
         plt.ylabel("Temperature")
```

Out[16]: <matplotlib.text.Text at 0x10aa9a150>