ASSIGNMENT 1

NUMPY

In [162]:

```
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
```

In [163]:

```
a = np.array([1,2,3])
b = np.array([[1,2,3],[4,5,6]])
a,b
```

Out[163]:

```
(array([1, 2, 3]),
 array([[1, 2, 3],
        [4, 5, 6]]))
```

In [164]:

```
print(b.ndim)
print(b.shape)
print(b.size)
print(b.dtype)
print(b.itemsize)
print(b.data)
print("********************")
print(a.ndim)
print(a.shape)
print(a.size)
print(a.dtype)
print(a.itemsize)
print(a.data)
```

```
2
(2, 3)
6
int32
4
<memory at 0x000001B5B8EB8930>
********************
1
(3,)
3
int32
4
<memory at 0x000001B5B8EC2F40>
```

In [165]:

```
a = np.zeros((2,3))
print(a)

b = np.ones((2,3))
print(b)

c = np.empty((2,3))
print(c)

d = np.arange(1, 2, 0.3)
print(d)

e = np.linspace(1, 3, 4)
print(e)

f = np.random.random((9,2))
print(f)
```

```
[[0. 0. 0.]
 [0. 0. 0.]]
[[1. 1. 1.]
 [1. 1. 1.]]
[[1. 1. 1.]
 [1. 1. 1.]]
[1.  1.3 1.6 1.9]
[1.         1.66666667 2.33333333 3.        ]
[[0.75127434 0.50164657]
 [0.83311132 0.1337208 ]
 [0.92577232 0.26216732]
 [0.362576   0.71281899]
 [0.61859737 0.21443515]
 [0.82159706 0.10427572]
 [0.92040726 0.90034181]
 [0.33018223 0.58921048]
 [0.43771194 0.30846615]]
```

In [166]:

```
a = np.array([(1,2,3), (4,5,6)])
b = np.arange(11, 23)
print(a)
print(b)
```

```
[[1 2 3]
 [4 5 6]]
[11 12 13 14 15 16 17 18 19 20 21 22]
```

In [167]:

```
b = b.reshape(2, 6)
print(b)
```

```
[[11 12 13 14 15 16]
 [17 18 19 20 21 22]]
```

In [168]:

```
b = b.reshape(6, -1)
print(b)
```

```
[[11 12]
 [13 14]
 [15 16]
 [17 18]
 [19 20]
 [21 22]]
```

In [169]:

```
a = b.reshape(6, -1)
b = b.reshape(6, -1)
c = np.vstack((a, b))
print(a)
print(b)
print(c)
```

```
[[11 12]
 [13 14]
 [15 16]
 [17 18]
 [19 20]
 [21 22]]
[[11 12]
 [13 14]
 [15 16]
 [17 18]
 [19 20]
 [21 22]]
[[11 12]
 [13 14]
 [15 16]
 [17 18]
 [19 20]
 [21 22]
 [11 12]
 [13 14]
 [15 16]
 [17 18]
 [19 20]
 [21 22]]
```

In [170]:

```
d = np.hstack((a, b))
print(d)
```

```
[[11 12 11 12]
 [13 14 13 14]
 [15 16 15 16]
 [17 18 17 18]
 [19 20 19 20]
 [21 22 21 22]]
```

In [171]:

```
e = np.hsplit(d,2)
print(e[0])
print(e[1])
```

```
[[11 12]
 [13 14]
 [15 16]
 [17 18]
 [19 20]
 [21 22]]
[[11 12]
 [13 14]
 [15 16]
 [17 18]
 [19 20]
 [21 22]]
```

In [172]:

```
e = np.vsplit(d,2)
print(e[0])
print(e[1])
```

```
[[11 12 11 12]
 [13 14 13 14]
 [15 16 15 16]]
[[17 18 17 18]
 [19 20 19 20]
 [21 22 21 22]]
```

In [173]:

```
arr = np.arange(1,12,4)
print("Sqrt: ",np.sqrt(arr))#Returns the square root of each element
print("Exp: ",np.exp(arr))     #Returns the exponentials of each element
print("Sin: ",np.sin(arr))     #Returns the sin of each element
print("Cos: ",np.cos(arr))     #Returns the|sine of each element
print("Log: ",np.log(arr))     #Returns the logarithm of each element
print("Sum: ",np.sum(arr))     #Returns the sum total of elements in the array
print("Std: ",np.std(arr))     #Returns the standard deviation of in the array
```

```
Sqrt:  [1.         2.23606798 3.        ]
Exp:  [2.71828183e+00 1.48413159e+02 8.10308393e+03]
Sin:  [ 0.84147098 -0.95892427  0.41211849]
Cos:  [ 0.54030231  0.28366219 -0.91113026]
Log:  [0.         1.60943791 2.19722458]
Sum:  15
Std:  3.265986323710904
```

In [174]:

```
arr = np.vstack((arr,arr,arr,arr))
print(arr)
print(arr.T)
print(arr.transpose())
arr = arr.reshape(2,6)
print(np.dot(arr,a))
```

```
[[1 5 9]
 [1 5 9]
 [1 5 9]
 [1 5 9]]
[[1 1 1 1]
 [5 5 5 5]
 [9 9 9 9]]
[[1 1 1 1]
 [5 5 5 5]
 [9 9 9 9]]
[[512 542]
 [512 542]]
```

In [175]:

```
print(np.random.random(20));

print(np.random.rand(3, 4));

print(np.random.randint(0, 100, 20));

print(np.random.permutation(np.arange(20)));
```

```
[0.5454307  0.03819351 0.81636617 0.39766138 0.39310083 0.87361066
 0.20698953 0.84951414 0.20924999 0.95684632 0.75372948 0.50859569
 0.9847731  0.10648727 0.28680467 0.06873582 0.05195702 0.68341922
 0.22186351 0.48946748]
[[0.67642587 0.13170412 0.82419946 0.87764815]
 [0.3169665  0.01350721 0.31024606 0.04639071]
 [0.14015834 0.95853778 0.32421691 0.19002155]]
[31  3 45 67 66 51  1 21 15 59 41 13  6 27 89 50 58  6 96 84]
[ 7  3  1 18  6 10 16 19  2  9 14 13 12  5 15  4 17  0  8 11]
```

PANDAS

In [176]:

```
pd.DataFrame({'Kabir': [50, 21], 'Suresh': [31, 22], 'Riya': [51, 20]},index=["Age","Cost"]
```

Out[176]:

	Kabir	Suresh	Riya
Age	50	31	51
Cost	21	22	20

In [177]:

```
pd.Series([1, 2, 3, 4, 5])
```

Out[177]:

```
0    1
1    2
2    3
3    4
4    5
dtype: int64
```

In [178]:

```
pd.Series([1, 2, 3, 4, 5],index=['a','b','c','d','e'])
```

Out[178]:

```
a    1
b    2
c    3
d    4
e    5
dtype: int64
```

In [196]:

```
data = pd.read_csv("./data.csv")
print(data)
```

```
n.com/Amazon-PowerFast-Adapter...)
34659  http://www.amazon.com/Amazon-PowerFast-Adapter... (http://www.amazo
n.com/Amazon-PowerFast-Adapter...)

                                          reviews.text  \
0      This product so far has not disappointed. My c...
1      great for beginner or experienced person. Boug...
2      Inexpensive tablet for him to use and learn on...
3      I've had my Fire HD 8 two weeks now and I love...
4      I bought this for my grand daughter when she c...
...                                                  ...
34655  This is not appreciably faster than any other ...
34656  Amazon should include this charger with the Ki...
34657  Love my Kindle Fire but I am really disappoint...
34658  I was surprised to find it did not come with a...
34659  to spite the fact that i have nothing but good...

                                       reviews.title reviews.userCity
\
0                                             Kindle               NaN
```

In [180]:

```
data.shape
```

Out[180]:

```
(34660, 21)
```

In [181]:

```
data.head()
```

Out[181]:

	id	name	asins	brand	categories	
0	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amazon/530
1	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amazon/530
2	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amazon/530
3	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amazon/530
4	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amazon/530

5 rows × 21 columns

In [182]:

```
data.id
```

Out[182]:

```
0        AVqkIhwDv8e3D1O-lebb
1        AVqkIhwDv8e3D1O-lebb
2        AVqkIhwDv8e3D1O-lebb
3        AVqkIhwDv8e3D1O-lebb
4        AVqkIhwDv8e3D1O-lebb
                ...
34655    AVpfiBlyLJeJML43-4Tp
34656    AVpfiBlyLJeJML43-4Tp
34657    AVpfiBlyLJeJML43-4Tp
34658    AVpfiBlyLJeJML43-4Tp
34659    AVpfiBlyLJeJML43-4Tp
Name: id, Length: 34660, dtype: object
```

In [183]:

```
data['id'][4]
```

Out[183]:

```
'AVqkIhwDv8e3D1O-lebb'
```

In [184]:

```
data.iloc[0]
```

Out[184]:

```
id                                                  AVqkIhwDv8e3D1O-lebb
name                    All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...
asins                                                         B01AHB9CN2
brand                                                             Amazon
categories              Electronics,iPad & Tablets,All Tablets,Fire Ta...
keys                    841667104676,amazon/53004484,amazon/b01ahb9cn2...
manufacturer                                                      Amazon
reviews.date                                       2017-01-13T00:00:00.000Z
reviews.dateAdded                                  2017-07-03T23:33:15Z
reviews.dateSeen        2017-06-07T09:04:00.000Z,2017-04-30T00:45:00.000Z
reviews.didPurchase                                                NaN
reviews.doRecommend                                               True
reviews.id                                                         NaN
reviews.numHelpful                                                 0.0
reviews.rating                                                     5.0
reviews.sourceURLs      http://reviews.bestbuy.com/3545/5620406/review... (h
ttp://reviews.bestbuy.com/3545/5620406/review...)
reviews.text            This product so far has not disappointed. My c...
reviews.title                                                     Kindle
reviews.userCity                                                   NaN
reviews.userProvince                                               NaN
reviews.username                                                Adapter
Name: 0, dtype: object
```

In [185]:

```
data.iloc[4:15,0]
```

Out[185]:

```
4     AVqkIhwDv8e3D1O-lebb
5     AVqkIhwDv8e3D1O-lebb
6     AVqkIhwDv8e3D1O-lebb
7     AVqkIhwDv8e3D1O-lebb
8     AVqkIhwDv8e3D1O-lebb
9     AVqkIhwDv8e3D1O-lebb
10    AVqkIhwDv8e3D1O-lebb
11    AVqkIhwDv8e3D1O-lebb
12    AVqkIhwDv8e3D1O-lebb
13    AVqkIhwDv8e3D1O-lebb
14    AVqkIhwDv8e3D1O-lebb
Name: id, dtype: object
```

In [186]:

```
data.iloc[[3,44,734,3452],0]
```

Out[186]:

```
3       AVqkIhwDv8e3D1O-lebb
44      AVqkIhwDv8e3D1O-lebb
734     AVqkIhwDv8e3D1O-lebb
3452    AVsRjfwAU2_QcyX9PHqe
Name: id, dtype: object
```

In [187]:

```
data.iloc[-5:,0]
```

Out[187]:

```
34655    AVpfiBlyLJeJML43-4Tp
34656    AVpfiBlyLJeJML43-4Tp
34657    AVpfiBlyLJeJML43-4Tp
34658    AVpfiBlyLJeJML43-4Tp
34659    AVpfiBlyLJeJML43-4Tp
Name: id, dtype: object
```

In [188]:

```
data.loc[:62,'reviews.title']
```

Out[188]:

```
0                                    Kindle
1                                 very fast
2     Beginner tablet for our 9 year old son.
3                                   Good!!!
4                  Fantastic Tablet for kids
                       ...
58    Present for my daughter & she loves it!
59                       Great little device
60       Perfect for artist reference photos!
61           Great tablet for what it's worth
62                                Great tablet
Name: reviews.title, Length: 63, dtype: object
```

In [189]:

```
data.loc[:62,['reviews.title','reviews.username']]
```

Out[189]:

	reviews.title	reviews.username
0	Kindle	Adapter
1	very fast	truman
2	Beginner tablet for our 9 year old son.	DaveZ
3	Good!!!	Shacks
4	Fantastic Tablet for kids	explore42
...	...	...
58	Present for my daughter & she loves it!	Timothy
59	Great little device	katt
60	Perfect for artist reference photos!	Patman
61	Great tablet for what it's worth	Netiks
62	Great tablet	Wanoo

63 rows × 2 columns

In [190]:

```
data.loc[(data.id=='AVqkIhwDv8e3D1O-lebb')]
```

Out[190]:

	id	name	asins	brand	categories	
0	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amaz
1	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amaz
2	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amaz
3	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amaz
4	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amaz
...	...	...	...	...	...	
2809	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amaz
2810	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amaz

	id	name	asins	brand	categories	
2811	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amaz
2812	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amaz
2813	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	B01AHB9CN2	Amazon	Electronics,iPad & Tablets,All Tablets,Fire Ta...	841667104676,amaz

2814 rows × 21 columns

Matplotlib

In [191]:

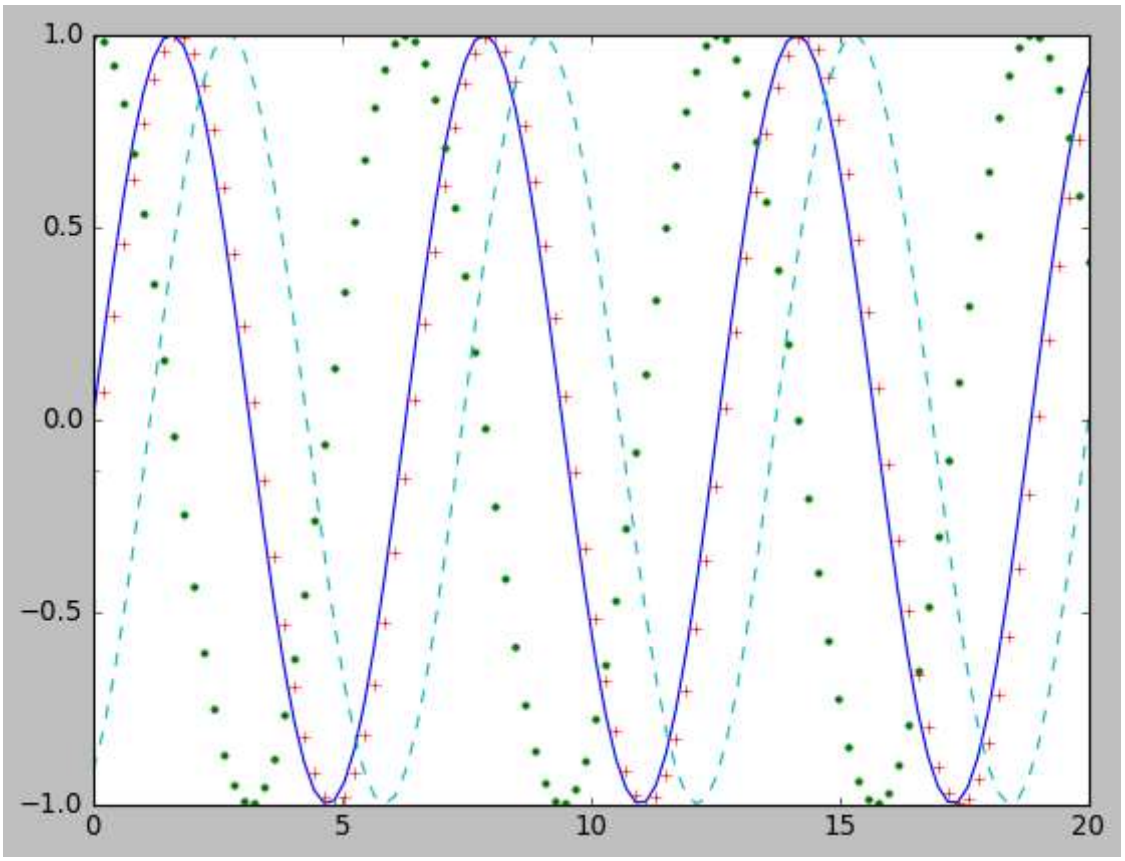
```
import matplotlib as mpl
import matplotlib.pyplot as plt
```

In [192]:

```
plt.style.use('classic')
```

In [193]:

```
import numpy as np

x = np.linspace(0, 20, 100)

plt.plot(x, np.sin(x),"-")
plt.plot(x, np.cos(x),".")
plt.plot(x, np.sin(x+25),"+")
plt.plot(x, np.sin(x-20),"--")

plt.show()
```

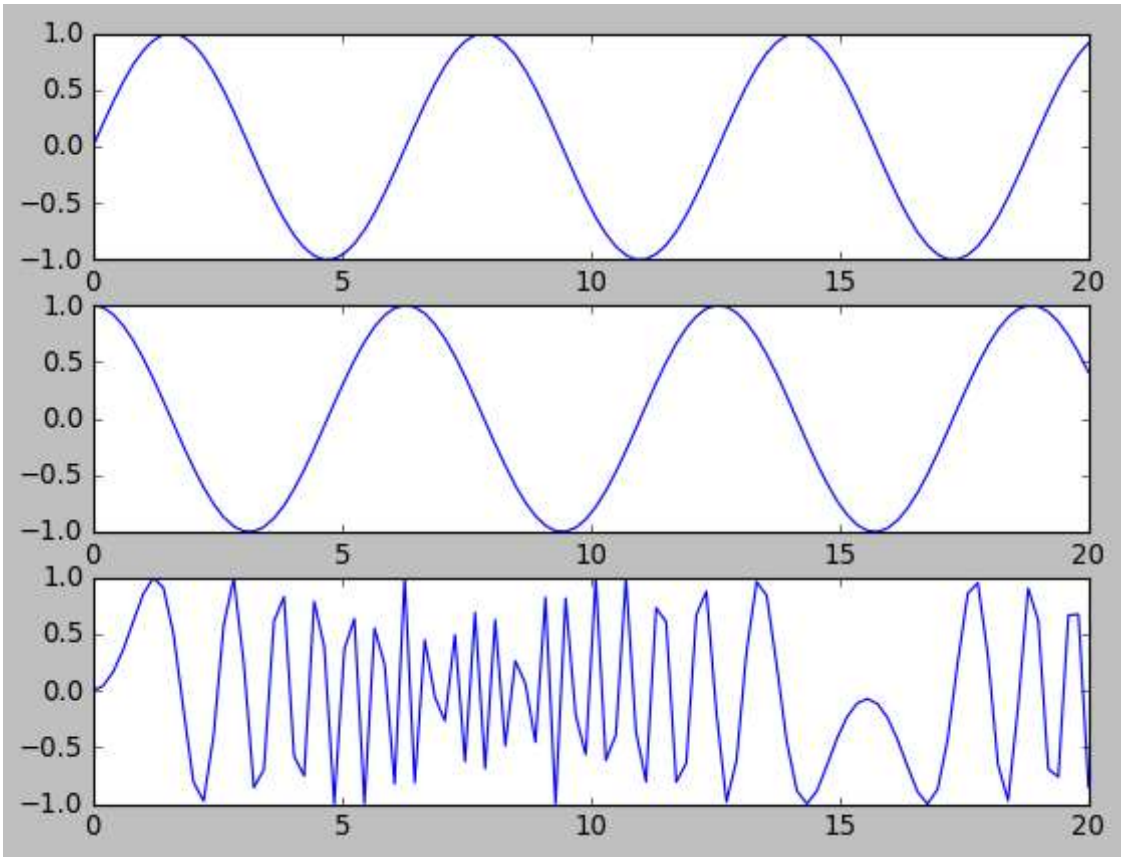


In [194]:

```
plt.figure()  # create a plot figure

# create the first of two panels and set current axis
plt.subplot(3, 1, 1) # (rows, columns, panel number)
plt.plot(x, np.sin(x))

# create the second panel and set current axis
plt.subplot(3, 1, 2)
plt.plot(x, np.cos(x));

plt.subplot(3, 1, 3) # (rows, columns, panel number)
plt.plot(x, np.sin(x**2))
```

Out[194]:

```
[<matplotlib.lines.Line2D at 0x1b5ba3242e0>]
```



In [195]:

```
# First create a grid of plots
# ax will be an array of two Axes objects
fig, ax = plt.subplots(3)

# Call plot() method on the appropriate object
ax[0].plot(x, np.tan(x))
ax[1].plot(x, np.cos(x))
ax[2].plot(x, np.sin(2*x))
```

Out[195]:

```
[<matplotlib.lines.Line2D at 0x1b5bc4327c0>]
```