Handout for Session 7

1. For loops and dictionaries

```
[1]: # Iterating through a dictionary
     d={'apple':5,'rice':4,'broccoli':8}
     for key in d:
         value=d[key]
         print(key,value)
```

```
apple 5
rice 4
broccoli 8
```

```
[2]: # Printing the dictionary in alphabetical order
     for key in sorted(d.keys()):
         print(key,d[key])
```

```
apple 5
broccoli 8
rice 4
```

```
[3]: # Building a dictionary iteratively
     l=['apple','rice','broccoli']
     d={}
     for item in l:
         d[item]=len(item)
     d
```

```
{'apple': 5, 'rice': 4, 'broccoli': 8}
```

Q1: Given the following dictionaries countaining word counts (`total` and `current`), use a `for` loop to iterate through the dictionary `current` and add the counts to the dictionary `total`. (If the word is not found in `total`, you have to first initialize the value in `total` to zero before adding.)

```
[4]: total={'happy':51,'cheap':30}
     current={'happy':2,'amazing':1,'price':2}
```

```
[5]:
```

```
{'happy': 53, 'cheap': 30, 'amazing': 1, 'price': 2}
```

2. Breaking Down Case 7a from Last Session (4 Step Method)

Step 1: Describe the task succintly and precisely

Obtain a list of unique domain names from a specified mail log, and print the list in alphabetical order.

Step 2: Decompose the task into components and describe how to do each in English

A. Traverse through the mail log and filter for lines starting with `"From:"`
B. Obtain the domain name from each line.
C. Maintain a list of unique domain names (using Q4 from last session).
D. Sort the list and print the elements.

Step 3: Translate each component into code and test them independently

[6]:
```
# A. Traverse through the mail log and filter for lines starting with "From:"...

file=open('mbox-short.txt','r')
for line in file:
    line=line.strip()
    if line.startswith("From:"):
        print(line)
```

```
From: stephen.marquard@uct.ac.za
From: louis@media.berkeley.edu
From: zqian@umich.edu
From: rjlowe@iupui.edu
...
```

[7]:
```
# B. Obtain the domain name from each line
line='From: stephen.marquard@uct.ac.za'
domain=line.split('@')[1]
domain
```

```
'uct.ac.za'
```

[8]:
```
# C. Maintain a list of unique domain names
l=['berkeley.edu']
domain='uct.ac.za'
if domain not in l:
    l.append(domain)
l
```

```
['berkeley.edu', 'uct.ac.za']
```

[9]:
```
domain='uct.ac.za'
if domain not in l:
    l.append(domain)
l
```

```
['berkeley.edu', 'uct.ac.za']
```

[10]:
```
# D. Sort the list and print the elements
l=['c','a','b']
l=sorted(l)
for e in l:
    print(e)
```

```
a
b
c
```

Step 4: Combine Together and Test

i) Copy paste all the code together

```
# A. Traverse through the mail log and filter for lines starting with "From:"...
file=open('mbox-short.txt','r')
for line in file:
    line=line.strip()
    if line.startswith("From:"):
        print(line)

# B. Obtain the domain name from each line
line='From: stephen.marquard@uct.ac.za'
domain=line.split('@')[1]

# C. Maintain a list of unique domain names
l=['berkeley.edu']
domain='uct.ac.za'
if domain not in l:
    l.append(domain)

# D. Sort the list and print the elements
l=['c','a','b']
l=sorted(l)
for e in l:
    print(e)
```

ii) Review the logical relationship based on the English descriptions in Step 2: Component B and C are inside the loop of component A (except that the initialization of the list should come first). Component D should take place afterward.

iii) Combine the code appropriately and test.

```
[11]: l=[]  # C1. Initialize the list of unique elements

      # A. Traverse through the mail log and filter for lines starting with "From:"...
      file=open('mbox-short.txt','r')
      for line in file:
          line=line.strip()
          if line.startswith("From:"):
              domain=line.split('@')[1]  # B. Obtain the domain name from each line
              if domain not in l:        # C2. Maintain the list of unique elements
                  l.append(domain)

      # D. Sort and print
      for e in sorted(l):
          print(e)
```

```
caret.cam.ac.uk
gmail.com
iupui.edu
media.berkeley.edu
uct.ac.za
```

umich.edu

Q2: Apply the above 4 step method to solve case 7b) from last session.

3. Pandas DataFrame Basics

```
[16]: dic1={'orange':6,'grape':5,'apple':5}
      dic2={'apple':'M','grape':'S','orange':'M'}

[17]: import pandas as pd
      df=pd.DataFrame({'Number of Letters':dic1,'Size':dic2})
      df
```

	Number of Letters	Size
apple	5	M
grape	5	S
orange	6	M

```
[18]: df.sort_values(by='Number of Letters',ascending=False)
```

	Number of Letters	Size
orange	6	M
apple	5	M
grape	5	S

```
[19]: df.sort_values(by=['Number of Letters','Size'],ascending=[False,True])
```

	Number of Letters	Size
orange	6	M
apple	5	M
grape	5	S

```
[38]: df
```

	Number of Letters	Size	Rank
apple	5	M	1
grape	5	S	3
orange	6	M	2

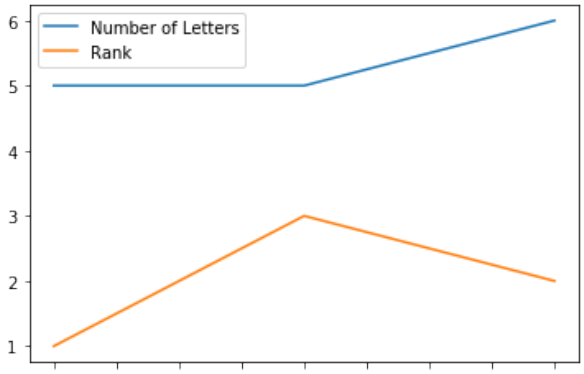
```
[37]: df['Rank']=[1,3,2]

[39]: df.head(2)
```

	Number of Letters	Size	Rank
apple	5	M	1
grape	5	S	3

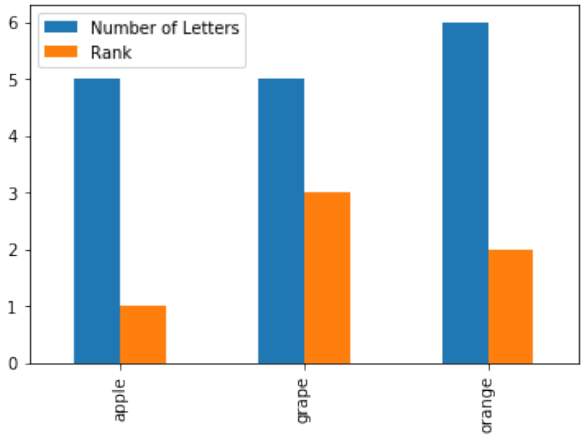
```
[40]: df.tail(1)
```

	Number of Letters	Size	Rank
orange	6	M	2

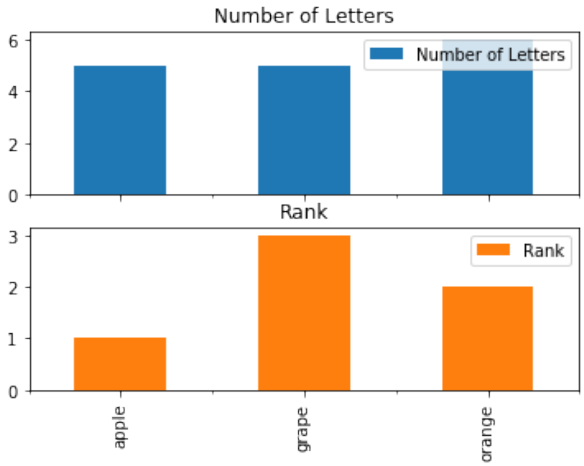
[41]:
```
import matplotlib.pyplot as plt
df.plot()
plt.show()
```



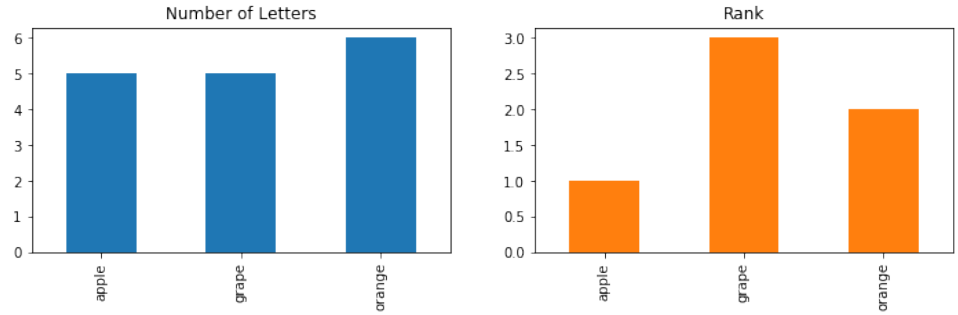
[27]:
```
df.plot(kind='bar')
plt.show()
```



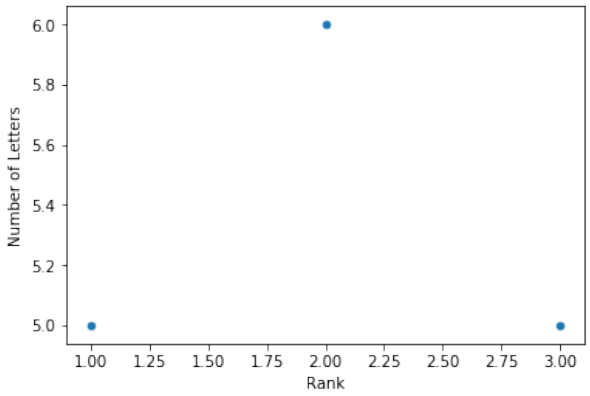
[28]:
```
df.plot(kind='bar',subplots=True)
plt.show()
```



[29]:
```
df.plot(kind='bar',subplots=True,figsize=(12,3),legend=False,layout=(1,2))
plt.show()
```



[30]:
```
df.plot(x='Rank',y='Number of Letters',kind='scatter')
plt.show()
```



[31]:
```
df.to_csv('session7_output.csv')
```

[32]:
```
pd.read_csv('session7_output.csv',index_col=0)
```

	Number of Letters	Size	Rank
apple	5	M	1
grape	5	S	3
orange	6	M	2

Q3-a: Create the following DataFrame and name it `phones`.

[33]:

	price	screen size
Samsung S9	619	5.8
iPhone 8	599	4.7
iPhone XR	749	6.1

Q3-b: Sort the columns in desrending order by screen size.
Q3-c: Obtain only the first two rows of the DataFrame (after sorting by screen size).
Q3-d: Create a scatter plot where x axis is screen size and y axis is price.