query-processing

November 30, 2023

1. Write a Pandas program to select distinct department id from employees file.

[ ]:

```
import pandas as pd
data = {
    'DEPARTMENT_ID': [ 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130,␣
 ↪140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270],
    'DEPARTMENT_NAME': ['Administration', 'Marketing', 'Purchasing', 'Human␣
 ↪Resources', 'Shipping', 'IT', 'Public Relations',
        'Sales', 'Executive', 'Finance', 'Accounting', 'Treasury', 'Corporate␣
 ↪Tax', 'Control And Credit',
        'Shareholder Services', 'Benefits', 'Manufacturing', 'Construction',␣
 ↪'Contracting', 'Operations',
        'IT Support', 'NOC', 'IT Helpdesk', 'Government Sales', 'Retail Sales',␣
 ↪'Recruiting', 'Payroll'],
    'MANAGER_ID': [200, 201, 114, 203, 121, 103, 204, 145, 100, 108, 205, 0, 0,␣
 ↪0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0],
    'LOCATION_ID': [1700, 1800, 1700, 2400, 1500, 1400, 2700, 2500, 1700, 1700,␣
 ↪1700, 1700, 1700, 1700, 1700, 1700, 1700, 1700, 1700, 1700, 1700, 1700,␣
 ↪1700, 1700, 1700, 1700, 1700]
}
employees = pd.DataFrame(data)
dist_id = employees['DEPARTMENT_ID'].unique()
dist_df = pd.DataFrame({'DEPARTMENT_ID': dist_id})
print(dist_df)
```

```
    DEPARTMENT_ID
0              10
1              20
2              30
3              40
4              50
5              60
6              70
7              80
8              90
9             100
10            110
11            120
```

```
12             130
13             140
14             150
15             160
16             170
17             180
18             190
19             200
20             210
21             220
22             230
23             240
24             250
25             260
26             270
```

2. Write a Pandas program to display the ID for those employees who did two or more jobs in the past.

[ ]:

```
import pandas as pd
data = {
    'EMPLOYEE_ID': [102, 101, 101, 201, 114, 122, 200, 176, 176, 200],
    'START_DATE': ['2001-01-13', '1997-09-21', '2001-10-28', '2004-02-17',␣
  ↪'2006-03-24', '2007-01-01', '1995-09-17', '2006-03-24', '2007-01-01',␣
  ↪'2002-07-01'],
    'END_DATE': ['2006-07-24', '2001-10-27', '2005-03-15', '2007-12-19',␣
  ↪'2007-12-31', '2007-12-31', '2001-06-17', '2006-12-31', '2007-12-31',␣
  ↪'2006-12-31'],
    'JOB_ID': ['IT_PROG', 'AC_ACCOUNT', 'AC_MGR', 'MK_REP', 'ST_CLERK',␣
  ↪'ST_CLERK', 'AD_ASST', 'SA_REP', 'SA_MAN', 'AC_ACCOUNT'],
    'DEPARTMENT_ID': [60, 110, 110, 20, 50, 50, 90, 80, 80, 90]
}
df = pd.DataFrame(data)
job_counts = df.groupby('EMPLOYEE_ID')['JOB_ID'].count()
result = job_counts[job_counts >= 2]
print(result)
```

```
EMPLOYEE_ID
101    2
176    2
200    2
Name: JOB_ID, dtype: int64
```

3. Write a Pandas program to display the details of jobs in descending sequence on job title.

[ ]:

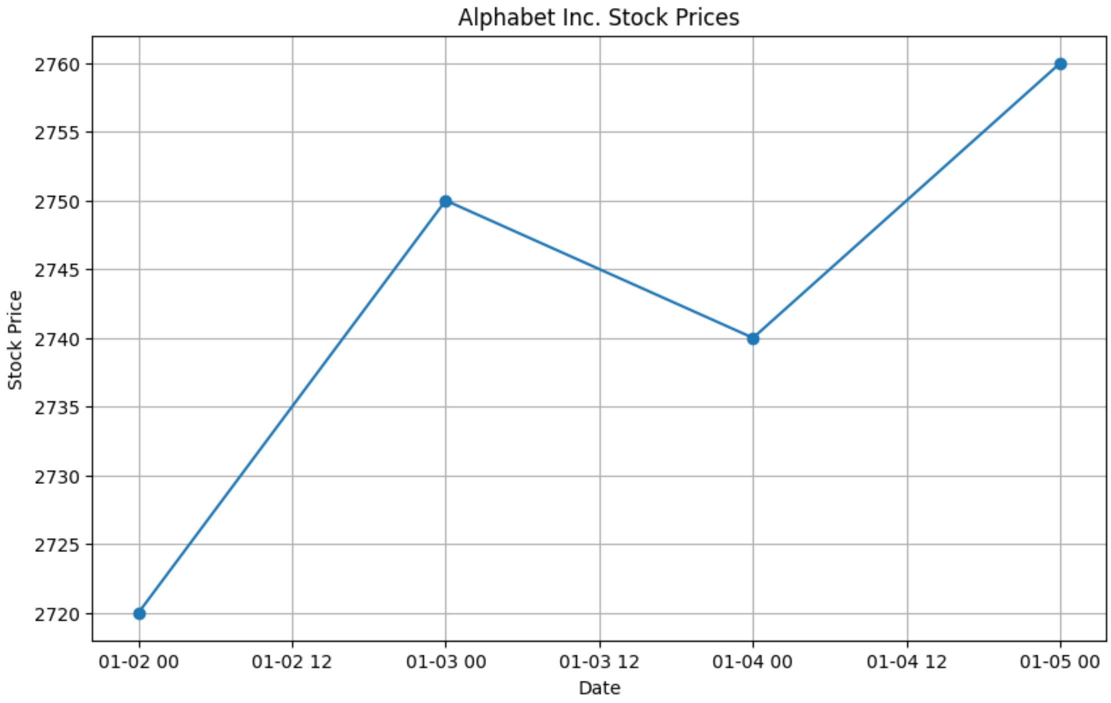
```
import pandas as pd
data = {
    'JOB_ID': ['AD_PRES', 'AD_VP', 'AD_ASST', 'FI_MGR', 'FI_ACCOUNT', 'AC_MGR',␣
 ↪'AC_ACCOUNT', 'SA_MAN', 'SA_REP', 'PU_MAN', 'PU_CLERK', 'ST_MAN',␣
 ↪'ST_CLERK', 'SH_CLERK', 'IT_PROG', 'MK_MAN', 'MK_REP', 'HR_REP', 'PR_REP'],
    'JOB_TITLE': ['President', 'Administration Vice President', 'Administration␣
 ↪Assistant', 'Finance Manager', 'Accountant', 'Accounting Manager', 'Public␣
 ↪Accountant', 'Sales Manager', 'Sales Representative', 'Purchasing Manager',␣
 ↪'Purchasing Clerk', 'Stock Manager', 'Stock Clerk', 'Shipping Clerk',␣
 ↪'Programmer', 'Marketing Manager', 'Marketing Representative', 'Human␣
 ↪Resources Representative', 'Public Relations Representative'],
    'MIN_SALARY': [20080, 15000, 3000, 8200, 4200, 8200, 4200, 10000, 6000,␣
 ↪8000, 2500, 5500, 2008, 2500, 4000, 9000, 4000, 4000, 4500],
    'MAX_SALARY': [40000, 30000, 6000, 16000, 9000, 16000, 9000, 20080, 12008,␣
 ↪15000, 5500, 8500, 5000, 5500, 10000, 15000, 9000, 9000, 10500]
}
df = pd.DataFrame(data)
sorted_df = df.sort_values(by='JOB_TITLE', ascending=False)
print(sorted_df)
```

```
        JOB_ID                        JOB_TITLE  MIN_SALARY  MAX_SALARY
11      ST_MAN                    Stock Manager        5500        8500
12    ST_CLERK                      Stock Clerk        2008        5000
13    SH_CLERK                   Shipping Clerk        2500        5500
8       SA_REP             Sales Representative        6000       12008
7       SA_MAN                    Sales Manager       10000       20080
9       PU_MAN               Purchasing Manager        8000       15000
10    PU_CLERK                 Purchasing Clerk        2500        5500
18      PR_REP  Public Relations Representative        4500       10500
6   AC_ACCOUNT                Public Accountant        4200        9000
14     IT_PROG                       Programmer        4000       10000
0      AD_PRES                        President       20080       40000
16      MK_REP         Marketing Representative        4000        9000
15      MK_MAN                Marketing Manager        9000       15000
17      HR_REP  Human Resources Representative        4000        9000
3       FI_MGR                  Finance Manager        8200       16000
1        AD_VP    Administration Vice President       15000       30000
2      AD_ASST         Administration Assistant        3000        6000
5       AC_MGR               Accounting Manager        8200       16000
4   FI_ACCOUNT                       Accountant        4200        9000
```

4. Write a Pandas program to create a line plot of the historical stock prices of Alphabet Inc. between two specific dates.

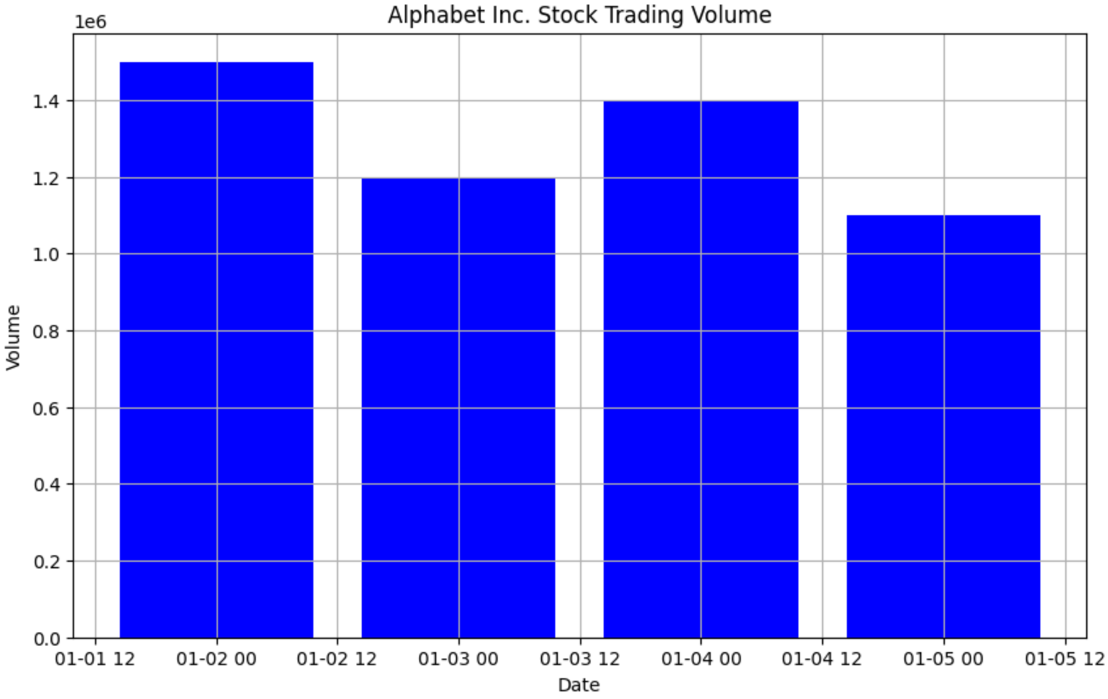
[ ]:

```
import pandas as pd
import matplotlib.pyplot as plt
data = {
    'Date': ['2023-01-01', '2023-01-02', '2023-01-03', '2023-01-04',␣
 ↪'2023-01-05', '2023-01-06'],
    'Price': [2700, 2720, 2750, 2740, 2760, 2770]
}
df = pd.DataFrame(data)
df['Date'] = pd.to_datetime(df['Date'])
df.set_index('Date', inplace=True)
start_date = '2023-01-02'
end_date = '2023-01-05'
filtered_df = df[start_date:end_date]
plt.figure(figsize=(10, 6))
plt.plot(filtered_df.index, filtered_df['Price'], marker='o', linestyle='-')
plt.title('Alphabet Inc. Stock Prices')
plt.xlabel('Date')
plt.ylabel('Stock Price')
plt.grid(True)
plt.show()
```



5. Write a Pandas program to create a bar plot of the trading volume of Alphabet Inc. stock between two specific dates.

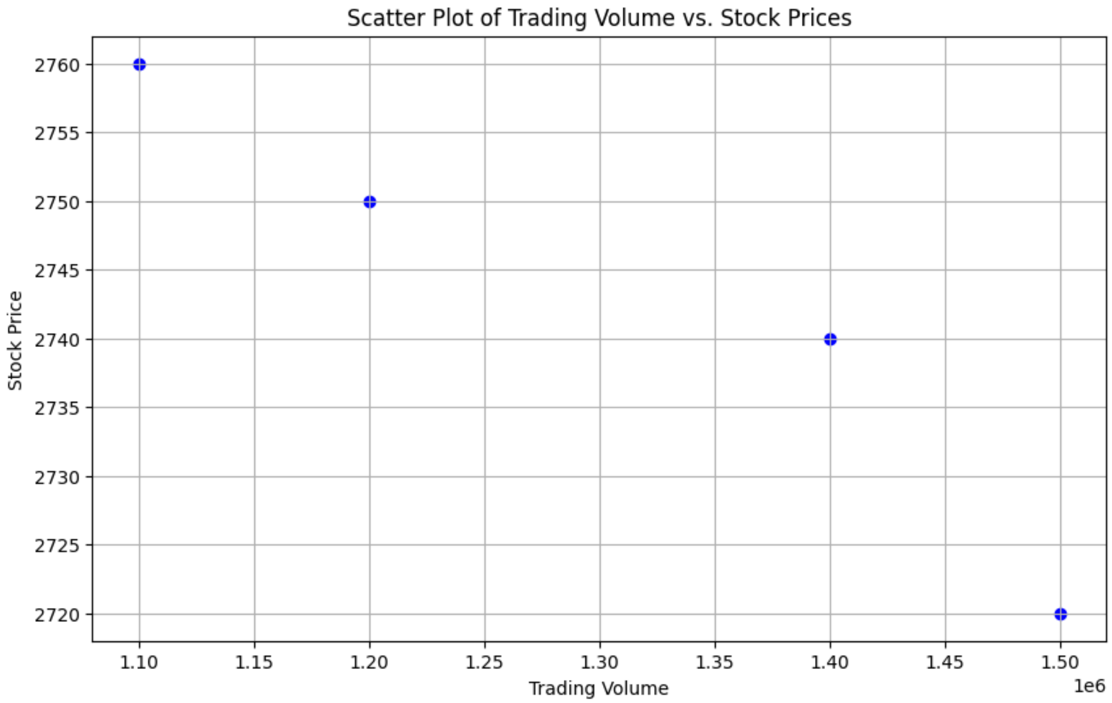
[ ]:
```
import pandas as pd
import matplotlib.pyplot as plt
data = {
    'Date': ['2023-01-01', '2023-01-02', '2023-01-03', '2023-01-04',␣
 ↪'2023-01-05', '2023-01-06'],
    'Volume': [1000000, 1500000, 1200000, 1400000, 1100000, 1600000]
}
df = pd.DataFrame(data)
df['Date'] = pd.to_datetime(df['Date'])
df.set_index('Date', inplace=True)
start_date = '2023-01-02'
end_date = '2023-01-05'
filtered_df = df[start_date:end_date]
plt.figure(figsize=(10, 6))
plt.bar(filtered_df.index, filtered_df['Volume'], color='blue')
plt.title('Alphabet Inc. Stock Trading Volume')
plt.xlabel('Date')
plt.ylabel('Volume')
plt.grid(True)
plt.show()
```



6. Write a Pandas program to create a scatter plot of the trading volume/stock prices of Alphabet Inc. stock between two specific dates. alphabet_stock_data:

[ ]:

```
import pandas as pd
import matplotlib.pyplot as plt
data = {
    'Date': ['2023-01-01', '2023-01-02', '2023-01-03', '2023-01-04',␣
 ↪'2023-01-05', '2023-01-06'],
    'Volume': [1000000, 1500000, 1200000, 1400000, 1100000, 1600000],
    'Price': [2700, 2720, 2750, 2740, 2760, 2770]
}
alphabet_stock_data = pd.DataFrame(data)
alphabet_stock_data['Date'] = pd.to_datetime(alphabet_stock_data['Date'])
alphabet_stock_data.set_index('Date', inplace=True)
start_date = '2023-01-02'
end_date = '2023-01-05'
filtered_data = alphabet_stock_data[start_date:end_date]
plt.figure(figsize=(10, 6))
plt.scatter(filtered_data['Volume'], filtered_data['Price'], color='blue',␣
 ↪marker='o')
plt.title('Scatter Plot of Trading Volume vs. Stock Prices')
plt.xlabel('Trading Volume')
plt.ylabel('Stock Price')
plt.grid(True)
plt.show()
```



7. Write a Pandas program to create a Pivot table and find the maximum and minimum sale value of the items.(refer sales_data table)

[ ]:

```
import pandas as pd
data = {
    'Item': ['A', 'B', 'A', 'C', 'B', 'A', 'C', 'B', 'A', 'C'],
    'Sale': [100, 200, 150, 300, 250, 180, 320, 220, 170, 310]
}
sales_data = pd.DataFrame(data)
pivot_table = pd.pivot_table(sales_data, values='Sale', index='Item',␣
 ↪aggfunc=[max, min])
pivot_table.columns = ['Max Sale', 'Min Sale']
print(pivot_table)
```

```
      Max Sale  Min Sale
Item
A          180       100
B          250       200
C          320       300
```

8. Write a Pandas program to create a Pivot table and find the item wise unit sold. .(refer sales_data table)

[ ]:

```
import pandas as pd
data = {
    'Item': ['A', 'B', 'A', 'C', 'B', 'A', 'C', 'B', 'A', 'C'],
    'Unit Sold': [5, 10, 8, 12, 15, 9, 16, 11, 7, 13]
}
sales_data = pd.DataFrame(data)
pivot_table = pd.pivot_table(sales_data, values='Unit Sold', index='Item',␣
 ↪aggfunc='sum')
print(pivot_table)
```

```
      Unit Sold
Item
A            29
B            36
C            41
```

9. Write a Pandas program to create a Pivot table and find the total sale amount region wise, manager wise, sales man wise. .(refer sales_data table)

[ ]:

```
import pandas as pd
data = {
    'OrderDate': ['1-6-18', '1-23-18', '2-9-18', '2-26-18', '3-15-18',␣
 ↪'4-1-18', '4-18-18', '5-5-18', '5-22-18', '6-8-18', '6-25-18', '7-12-18',␣
 ↪'7-29-18', '8-15-18', '9-1-18', '9-18-18', '10-5-18', '10-22-18'],
    'Region': ['East', 'Central', 'Central', 'Central', 'West', 'East',␣
 ↪'Central', 'Central', 'West', 'East', 'Central', 'East', 'East', 'East',␣
 ↪'Central', 'East', 'Central', 'East'],
    'Manager': ['Martha', 'Hermann', 'Hermann', 'Timothy', 'Timothy', 'Martha',␣
 ↪'Martha', 'Hermann', 'Douglas', 'Martha', 'Hermann', 'Martha', 'Douglas',␣
 ↪'Martha', 'Douglas', 'Martha', 'Hermann', 'Martha'],
    'SalesMan': ['Alexander', 'Shelli', 'Luis', 'David', 'Stephen',␣
 ↪'Alexander', 'Steven', 'Luis', 'Michael', 'Alexander', 'Sigal', 'Diana',␣
 ↪'Karen', 'Alexander', 'John', 'Alexander', 'Sigal', 'Alexander'],
    'Item': ['Television', 'Home Theater', 'Television', 'Cell Phone',␣
 ↪'Television', 'Home Theater', 'Television', 'Television', 'Television',␣
 ↪'Home Theater', 'Television', 'Home Theater', 'Home Theater', 'Television',␣
 ↪'Desk', 'Video Games', 'Home Theater', 'Cell Phone'],
    'Units': [95, 50, 36, 27, 56, 60, 75, 90, 32, 60, 90, 29, 81, 35, 2, 16,␣
 ↪28, 64],
    'Unit_price': [1198.00, 500.00, 1198.00, 225.00, 1198.00, 500.00, 1198.00,␣
 ↪1198.00, 1198.00, 500.00, 1198.00, 500.00, 500.00, 1198.00, 125.00, 58.50,␣
 ↪500.00, 225.00],
    'Sale_amt': [113810.00, 25000.00, 43128.00, 6075.00, 67088.00, 30000.00,␣
 ↪89850.00, 107820.00, 38336.00, 30000.00, 107820.00, 14500.00, 40500.00,␣
 ↪41930.00, 250.00, 936.00, 14000.00, 14400.00]
}
sales_data = pd.DataFrame(data)
pivot_table = pd.pivot_table(sales_data, values='Sale_amt', index=['Region',␣
 ↪'Manager', 'SalesMan'], aggfunc='sum')
print(pivot_table)
```

```
                           Sale_amt
Region  Manager SalesMan
Central Douglas John          250.0
        Hermann Luis       150948.0
                Shelli      25000.0
                Sigal      121820.0
        Martha  Steven      89850.0
        Timothy David        6075.0
East    Douglas Karen       40500.0
        Martha  Alexander  231076.0
                Diana       14500.0
West    Douglas Michael     38336.0
        Timothy Stephen     67088.0
```

10.Create a dataframe of ten rows, four columns with random values. Write a Pandas program to highlight the negative numbers red and positive numbers black

```
[ ]: import pandas as pd
     import numpy as np
     data = np.random.randn(10, 4)
     df = pd.DataFrame(data, columns=['Column1', 'Column2', 'Column3', 'Column4'])
     styled_df = df.style.applymap(lambda val: f'color: {"red" if val < 0 else␣
      ↪"black"}')
     styled_df
```

```
[ ]: <pandas.io.formats.style.Styler at 0x7c59c4c6a830>
```

11.Create a dataframe of ten rows, four columns with random values. Convert some values to nan values. Write a Pandas program which will highlight the nan values.

[ ]:
```
import pandas as pd
import numpy as np
data = np.random.randn(10, 4)
df = pd.DataFrame(data, columns=['Column1', 'Column2', 'Column3', 'Column4'])
rows, cols = np.random.choice(10, size=5), np.random.choice(4, size=5)
df.iloc[rows, cols] = np.nan
styled_df = df.style.applymap(lambda val: f'background-color: red' if pd.
 ↪isna(val) else '')
styled_df
```

```
[ ]: <pandas.io.formats.style.Styler at 0x7c59c4daaad0>
```

12.Create a dataframe of ten rows, four columns with random values. Write a Pandas program to set dataframe background Color black and font color yellow

[ ]:
```
import pandas as pd
import numpy as np
data = np.random.randn(10, 4)
df = pd.DataFrame(data, columns=['Column1', 'Column2', 'Column3', 'Column4'])
styled_df = df.style.set_properties(**{'background-color': 'black', 'color':␣
 ↪'yellow'})
styled_df
```

```
[ ]: <pandas.io.formats.style.Styler at 0x7c59c4c682e0>
```

13.Write a Pandas program to detect missing values of a given DataFrame. Display True or False.

[ ]:
```
import pandas as pd
import numpy as np
data = {
    'A': [1, 2, np.nan, 4, 5],
    'B': [np.nan, 2, 3, 4, np.nan],
    'C': [1, 2, 3, np.nan, 5]
}
df = pd.DataFrame(data)
missing_values = df.isnull()
print(missing_values)
```

```
       A      B      C
0  False   True  False
1  False  False  False
2   True  False  False
3  False  False   True
4  False   True  False
```

14. Write a Pandas program to find and replace the missing values in a given DataFrame which do not have any valuable information

[ ]:

```
import pandas as pd
import numpy as np
data = {
    'A': [1, 2, np.nan, 4, 5],
    'B': [np.nan, 2, 3, 4, np.nan],
    'C': [1, 2, 3, np.nan, 5]
}
df = pd.DataFrame(data)
value_to_replace = -1
df_filled = df.fillna(value_to_replace)
print(df_filled)
```

```
     A    B    C
0  1.0 -1.0  1.0
1  2.0  2.0  2.0
2 -1.0  3.0  3.0
3  4.0  4.0 -1.0
4  5.0 -1.0  5.0
```

15.Write a Pandas program to keep the rows with at least 2 NaN values in a given DataFrame

[ ]:

```
import pandas as pd
import numpy as np
data = {'A': [1, 2, np.nan, 4, 5],
        'B': [np.nan, 2, 3, np.nan, 5],
        'C': [1, 2, np.nan, np.nan, 5]}
df = pd.DataFrame(data)
result = df[df.isna().sum(axis=1) >= 2]
print(result)
```

```
     A    B   C
2  NaN  3.0 NaN
3  4.0  NaN NaN
```

16.Write a Pandas program to split the following dataframe into groups based on school code. Also check the type of GroupBy object

[ ]:

```
import pandas as pd
data = {'StudentID': [1, 2, 3, 4, 5],
        'Name': ['Alice', 'Bob', 'Charlie', 'David', 'Eva'],
        'SchoolCode': ['S001', 'S002', 'S001', 'S002', 'S001']}
df = pd.DataFrame(data)
grouped = df.groupby('SchoolCode')
for name, group in grouped:
    print(f"Group: {name}")
    print(group)
    print("\n")
print(f"Type of GroupBy object: {type(grouped)}")
```

```
Group: S001
   StudentID     Name SchoolCode
0          1    Alice       S001
2          3  Charlie       S001
4          5      Eva       S001


Group: S002
   StudentID   Name SchoolCode
1          2    Bob       S002
3          4  David       S002


Type of GroupBy object: <class 'pandas.core.groupby.generic.DataFrameGroupBy'>
```

17.Write a Pandas program to split the following dataframe by school code and get mean, min, and max value of age for each school.

[ ]:
```
import pandas as pd
data = {'Student': ['Alice', 'Bob', 'Charlie', 'David', 'Eva'],
        'School Code': [101, 102, 101, 103, 102],
        'Age': [15, 17, 14, 16, 18]}
df = pd.DataFrame(data)
grouped = df.groupby('School Code')['Age'].agg(['mean', 'min', 'max'])
grouped.reset_index(inplace=True)
print(grouped)
```

```
   School Code  mean  min  max
0          101  14.5   14   15
1          102  17.5   17   18
2          103  16.0   16   16
```

18.Write a Pandas program to split the following given dataframe into groups based on school code and class.

[ ]:
```
import pandas as pd
data = {'Student': ['Alice', 'Bob', 'Charlie', 'David', 'Eva'],
        'School Code': [101, 102, 101, 103, 102],
        'Class': ['A', 'B', 'A', 'C', 'B'],
        'Age': [15, 17, 14, 16, 18]}
df = pd.DataFrame(data)
grouped = df.groupby(['School Code', 'Class'])
for (school_code, class_), group in grouped:
    print(f"School Code: {school_code}, Class: {class_}")
    print(group)
    print()
```

```
School Code: 101, Class: A
   Student  School Code Class  Age
0    Alice          101     A   15
2  Charlie          101     A   14

School Code: 102, Class: B
  Student  School Code Class  Age
1      Bob          102     B   17
4      Eva          102     B   18

School Code: 103, Class: C
  Student  School Code Class  Age
3   David          103     C   16
```

19.Write a Pandas program to display the dimensions or shape of the World alcohol consumption dataset. Also extract the column names from the dataset.

[ ]:

```
import pandas as pd
data = {
    'Country': ['USA', 'Canada', 'UK', 'Australia', 'Germany'],
    'Beer': [25, 20, 15, 22, 18],
    'Spirit': [10, 8, 7, 12, 9],
    'Wine': [5, 7, 8, 4, 7],
}
df = pd.DataFrame(data)
dimensions = df.shape
print(f"Dimensions of the dataset: {dimensions}")
column_names = df.columns
print("Column names:")
for column in column_names:
    print(column)
```

```
Dimensions of the dataset: (5, 4)
Column names:
Country
Beer
Spirit
Wine
```

20.Write a Pandas program to find the index of a given substring of a DataFrame column.

[ ]:

```
import pandas as pd
data = {
    'Text': ['Hello, world', 'This is a test', 'Pandas is great', 'DataFrames␣
 ↪are useful']
}
df = pd.DataFrame(data)
substring = 'is'
result = df['Text'].str.find(substring)
print("Index of substring 'is' in the 'Text' column:")
print(result)
```

```
Index of substring 'is' in the 'Text' column:
0   -1
1    2
2    7
3   -1
Name: Text, dtype: int64
```

21.Write a Pandas program to swap the cases of a specified character column in a given DataFrame

[ ]:

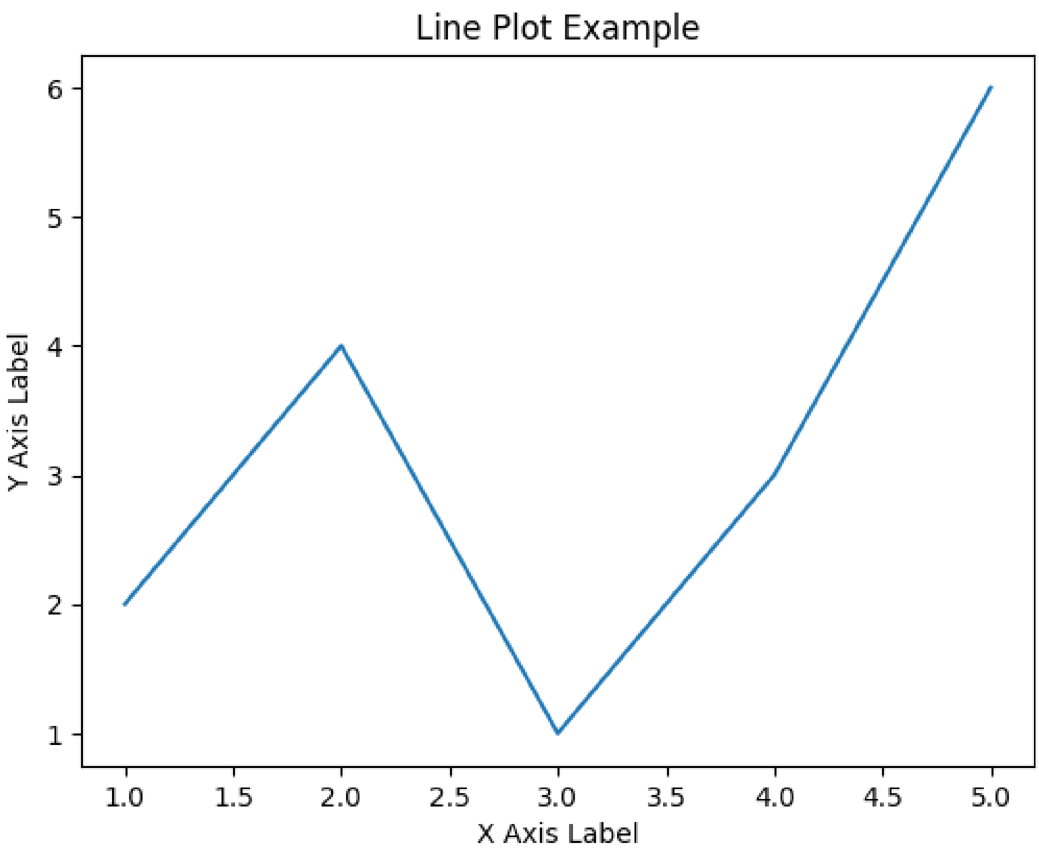
```
import pandas as pd
data = {
    'Text': ['Hello, World', 'This is a Test', 'Pandas is Great', 'DataFrames␣
  ↪are Useful']
}
df = pd.DataFrame(data)
column_to_swap = 'Text'
df[column_to_swap] = df[column_to_swap].str.swapcase()
print("DataFrame with Cases Swapped:")
print(df)
```

```
DataFrame with Cases Swapped:
                    Text
0           hELLO, wORLD
1         tHIS IS A tEST
2        pANDAS IS gREAT
3   dATAfRAMES ARE uSEFUL
```

22.Write a Python program to draw a line with suitable label in the x axis, y axis and a title.

[ ]:

```
import matplotlib.pyplot as plt
x = [1, 2, 3, 4, 5]
y = [2, 4, 1, 3, 6]
plt.plot(x, y)
plt.xlabel("X Axis Label")
plt.ylabel("Y Axis Label")
plt.title("Line Plot Example")
plt.show()
```

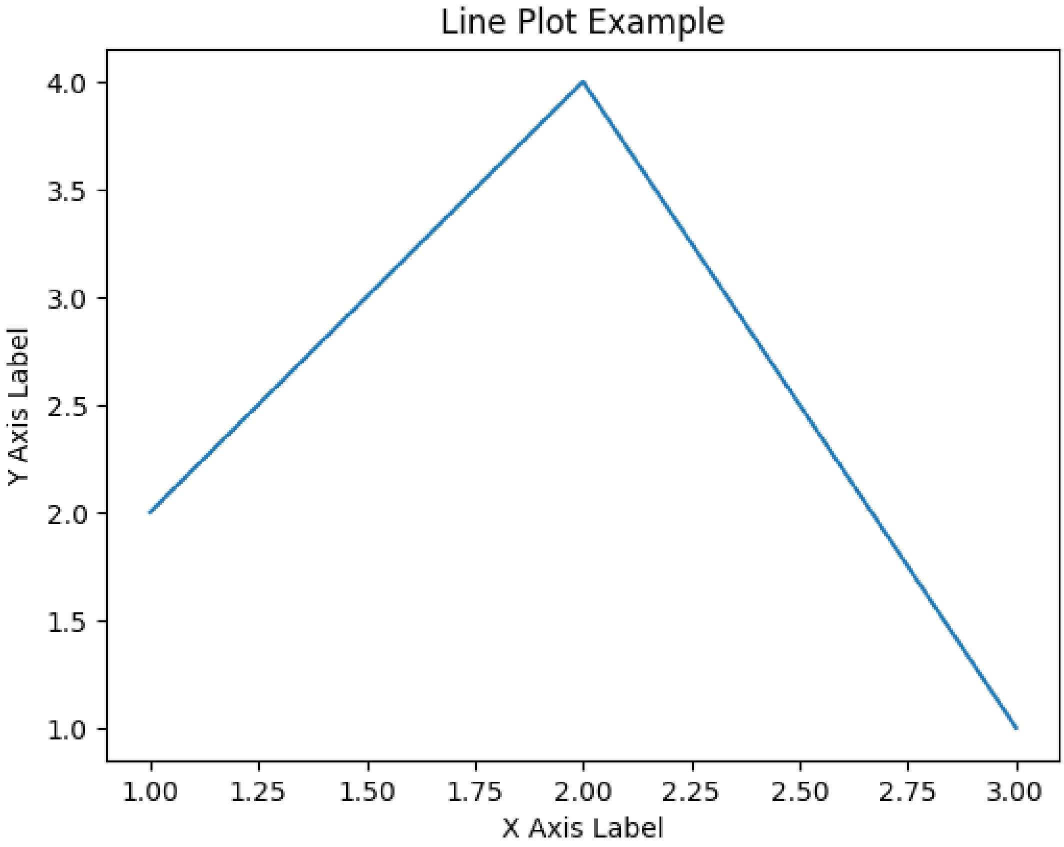


23.Write a Python program to draw a line using given axis values taken from a text file, with suitable label in the x axis, y axis and a title. Test Data: test.txt 1 2 2 4 3 1

[ ]:

```python
import matplotlib.pyplot as plt
from google.colab import files
uploaded = files.upload()
file_name = '/content/text.txt'
with open(file_name, 'r') as file:
    lines = file.readlines()
x = []
y = []
for line in lines:
    values = line.split()
    x.append(float(values[0]))
    y.append(float(values[1]))
plt.plot(x, y)
plt.xlabel("X Axis Label")
plt.ylabel("Y Axis Label")
plt.title("Line Plot Example")
plt.show()
```

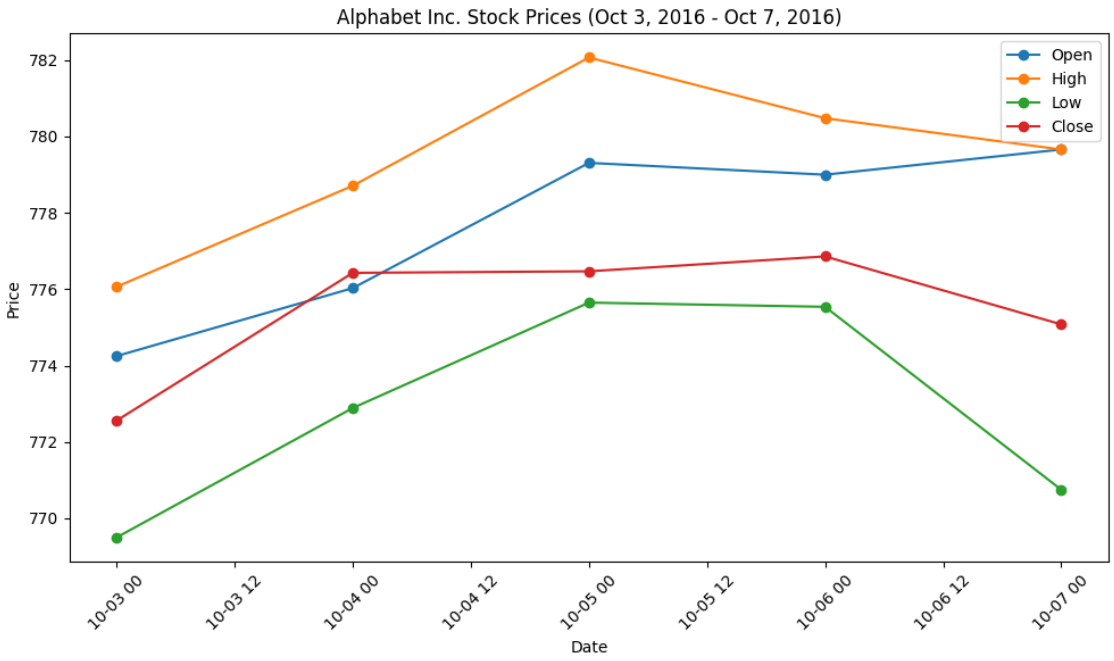
```
<IPython.core.display.HTML object>

Saving text.txt to text (2).txt
```



24.Write a Python program to draw line charts of the financial data of Alphabet Inc. between October 3, 2016 to October 7, 2016. Sample Financial data (fdata.csv): Date,Open,High,Low,Close 10-03-16,774.25,776.065002,769.5,772.559998 10-04-16,776.030029,778.710022,772.890015,776.429993 10-05-16,779.309998,782.070007,775.650024,776.469971 10-06-16,779,780.47998,775.539978,776.859985 10-07-16,779.659973,779.659973,770.75,775.080017

[ ]:
```
import pandas as pd
import matplotlib.pyplot as plt
data = {
    'Date': ['10-03-16', '10-04-16', '10-05-16', '10-06-16', '10-07-16'],
    'Open': [774.25, 776.030029, 779.309998, 779, 779.659973],
    'High': [776.065002, 778.710022, 782.070007, 780.47998, 779.659973],
    'Low': [769.5, 772.890015, 775.650024, 775.539978, 770.75],
    'Close': [772.559998, 776.429993, 776.469971, 776.859985, 775.080017]
}
df = pd.DataFrame(data)
```

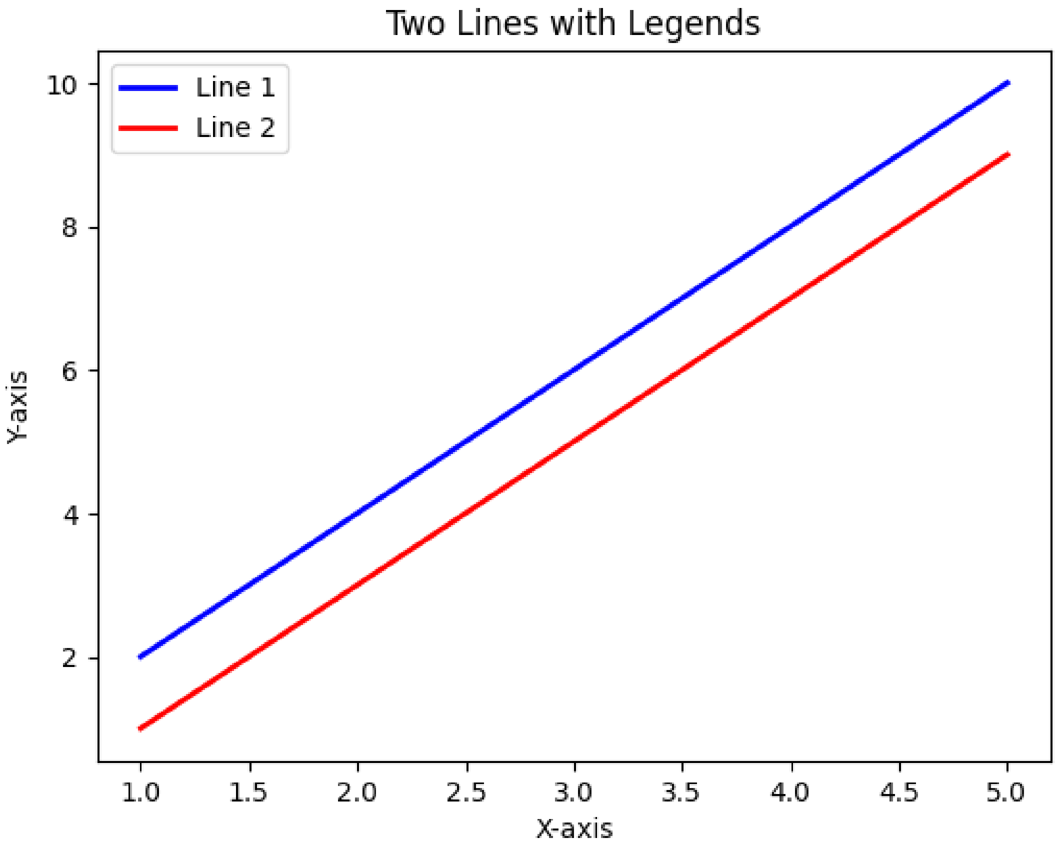
```python
df['Date'] = pd.to_datetime(df['Date'])
df.set_index('Date', inplace=True)
plt.figure(figsize=(10, 6))
plt.plot(df.index, df['Open'], label='Open', marker='o')
plt.plot(df.index, df['High'], label='High', marker='o')
plt.plot(df.index, df['Low'], label='Low', marker='o')
plt.plot(df.index, df['Close'], label='Close', marker='o')
plt.xlabel('Date')
plt.ylabel('Price')
plt.title('Alphabet Inc. Stock Prices (Oct 3, 2016 - Oct 7, 2016)')
plt.xticks(rotation=45)
plt.legend()
plt.tight_layout()
plt.show()
```



25.Write a Python program to plot two or more lines with legends, different widths and colors

[ ]:

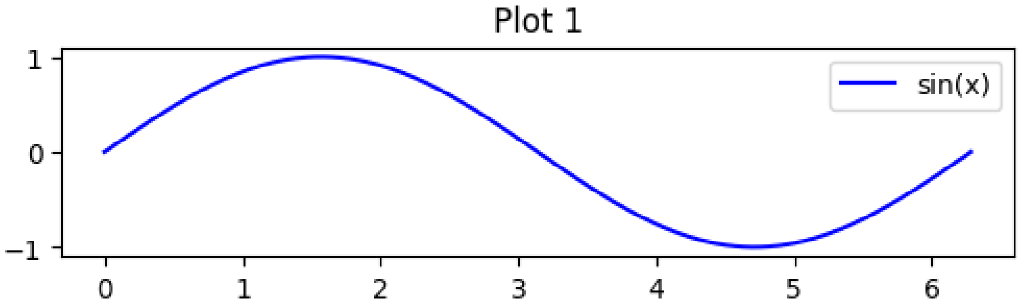
```python
import matplotlib.pyplot as plt
x = [1, 2, 3, 4, 5]
y1 = [2, 4, 6, 8, 10]
y2 = [1, 3, 5, 7, 9]
plt.plot(x, y1, label='Line 1', color='blue', linewidth=2)
plt.plot(x, y2, label='Line 2', color='red', linewidth=2)
plt.xlabel('X-axis')
plt.ylabel('Y-axis')
plt.title('Two Lines with Legends')
plt.legend()
plt.show()
```

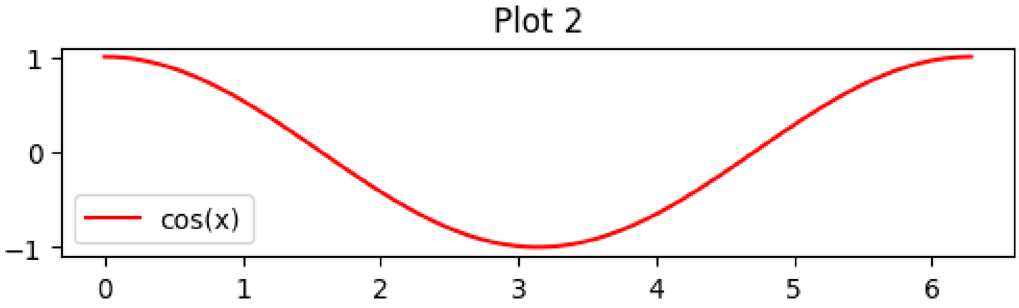


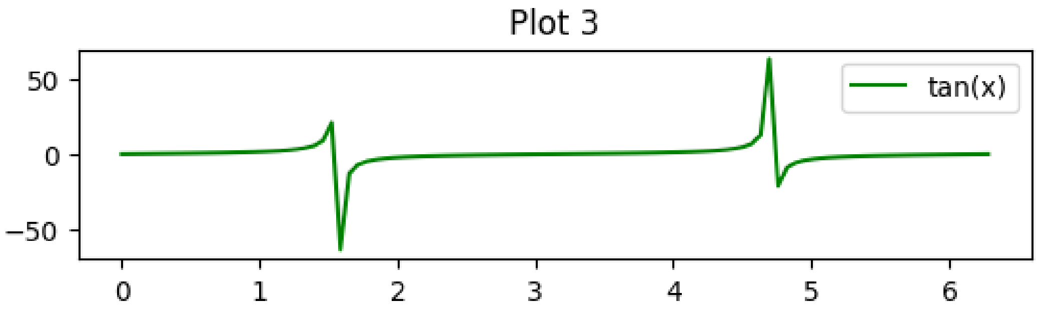
26.Write a Python program to create multiple plots.

[ ]:
```
import matplotlib.pyplot as plt
import numpy as np
# Create some sample data
x = np.linspace(0, 2 * np.pi, 100)
y1 = np.sin(x)
y2 = np.cos(x)
y3 = np.tan(x)

# Create the first plot
plt.figure(1)
plt.subplot(311)
plt.plot(x, y1, label='sin(x)', color='blue')
plt.title('Plot 1')
plt.legend()
```

```
# Create the second plot
plt.figure(2)
plt.subplot(312)
plt.plot(x, y2, label='cos(x)', color='red')
plt.title('Plot 2')
plt.legend()

# Create the third plot
plt.figure(3)
plt.subplot(313)
plt.plot(x, y3, label='tan(x)', color='green')
plt.title('Plot 3')
plt.legend()

# Show the plots
plt.show()
```



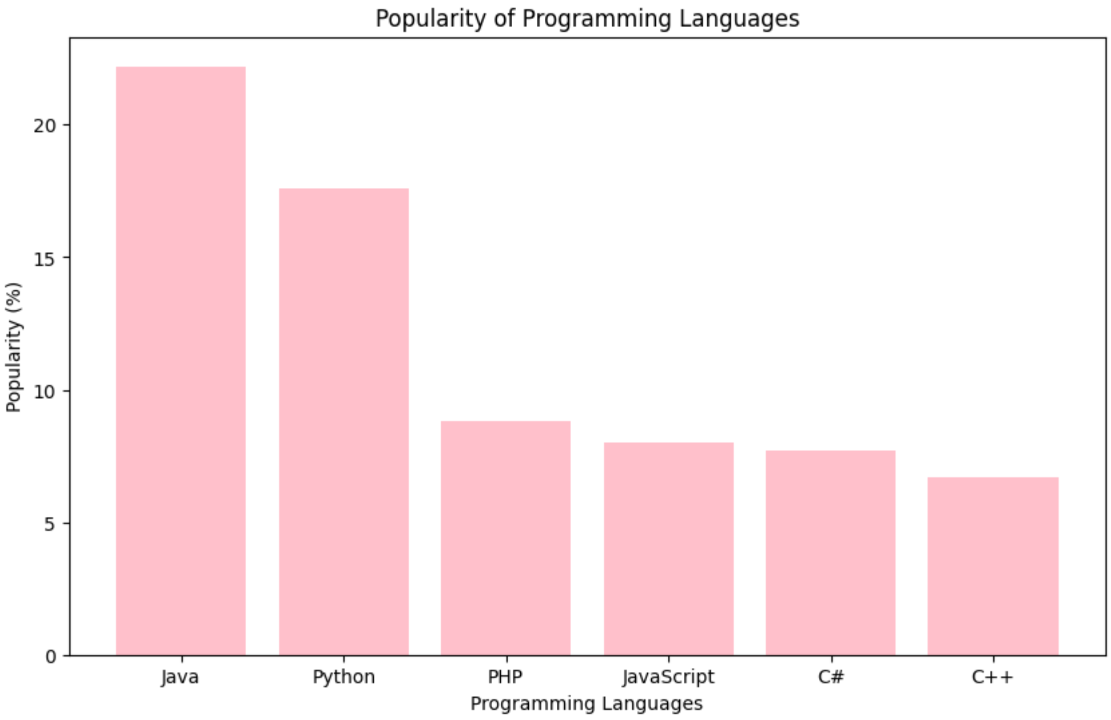




27.Write a Python programming to display a bar chart of the popularity of programming Languages. Sample data: Programming languages: Java, Python, PHP, JavaScript, C#, C++ Popularity: 22.2, 17.6, 8.8, 8, 7.7, 6.7

[ ]:

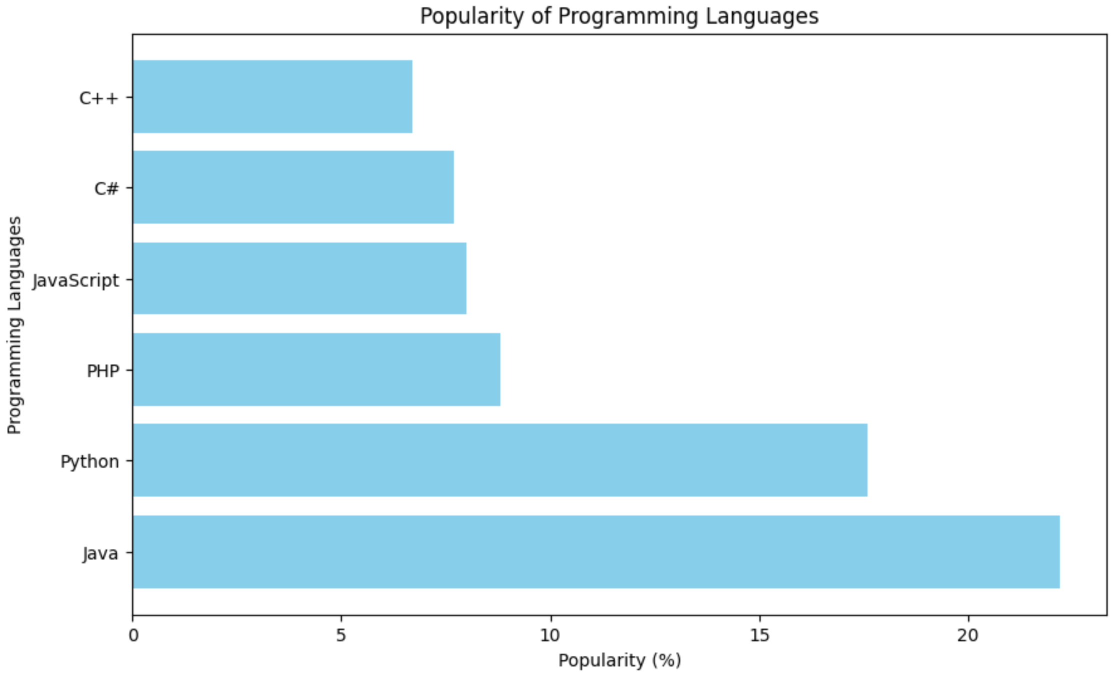
```python
import matplotlib.pyplot as plt
languages = ["Java", "Python", "PHP", "JavaScript", "C#", "C++"]
popularity = [22.2, 17.6, 8.8, 8, 7.7, 6.7]
plt.figure(figsize=(10, 6))
plt.bar(languages, popularity, color='pink')
plt.xlabel("Programming Languages")
plt.ylabel("Popularity (%)")
plt.title("Popularity of Programming Languages")
plt.show()
```



28.Write a Python programming to display a horizontal bar chart of the popularity of programming Languages. Sample data: Programming languages: Java, Python, PHP, JavaScript, C#, C++ Popularity: 22.2, 17.6, 8.8, 8, 7.7, 6.7

[ ]:

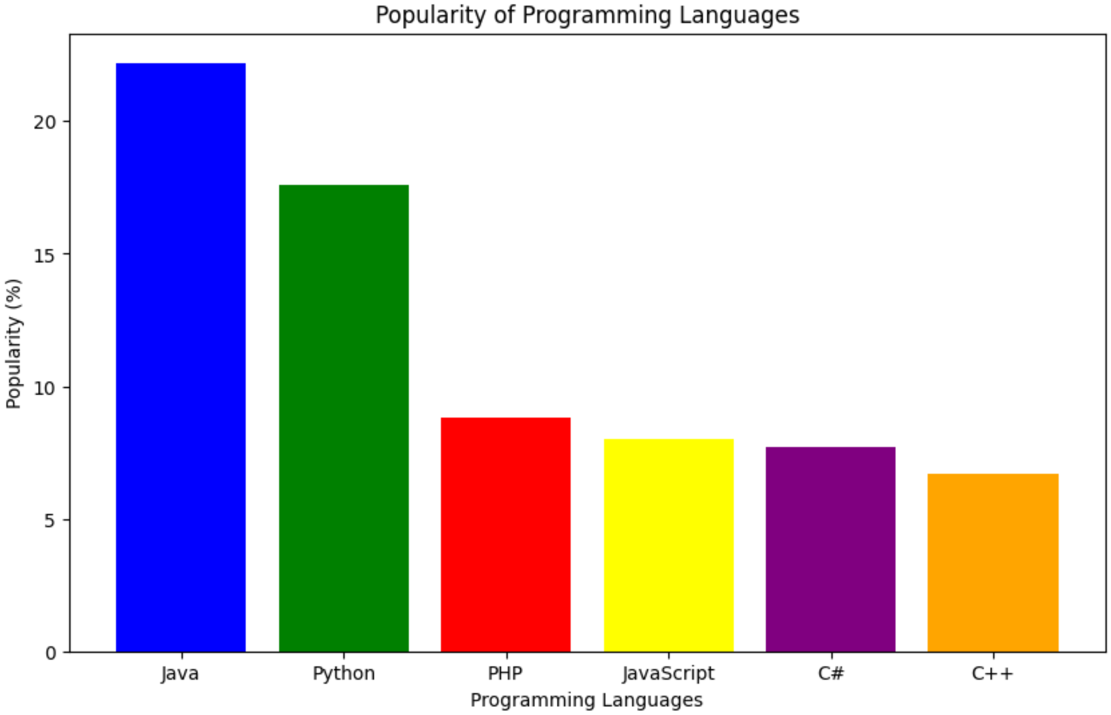
```python
import matplotlib.pyplot as plt
languages = ["Java", "Python", "PHP", "JavaScript", "C#", "C++"]
popularity = [22.2, 17.6, 8.8, 8, 7.7, 6.7]
plt.figure(figsize=(10, 6))
plt.barh(languages, popularity, color='skyblue')
plt.xlabel("Popularity (%)")
plt.ylabel("Programming Languages")
plt.title("Popularity of Programming Languages")
plt.show()
```



29.Write a Python programming to display a bar chart of the popularity of programming Languages. Use different color for each bar. Sample data: Programming languages: Java, Python, PHP, JavaScript, C#, C++ Popularity: 22.2, 17.6, 8.8, 8, 7.7, 6.7

[ ]:

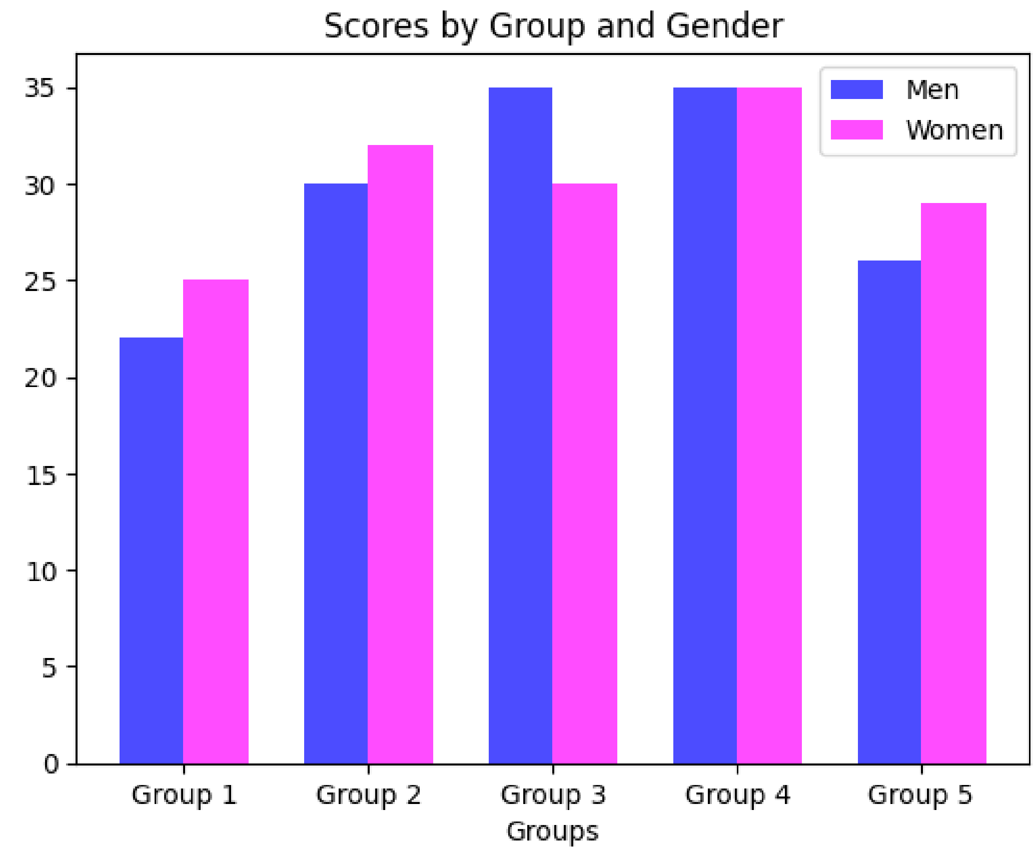
```python
import matplotlib.pyplot as plt
languages = ["Java", "Python", "PHP", "JavaScript", "C#", "C++"]
popularity = [22.2, 17.6, 8.8, 8, 7.7, 6.7]
colors = ['blue', 'green', 'red', 'yellow', 'purple', 'orange']
plt.figure(figsize=(10, 6))
plt.bar(languages, popularity, color=colors)
plt.xlabel("Programming Languages")
plt.ylabel("Popularity (%)")
plt.title("Popularity of Programming Languages")
plt.show()
```



30.Write a Python program to create bar plot of scores by group and gender. Use multiple X values on the same chart for men and women. Sample Data: Means (men) = (22, 30, 35, 35, 26) Means (women) = (25, 32, 30, 35, 29)

[ ]:

```
import matplotlib.pyplot as plt
import numpy as np
groups = ['Group 1', 'Group 2', 'Group 3', 'Group 4', 'Group 5']
means_men = [22, 30, 35, 35, 26]
means_women = [25, 32, 30, 35, 29]
bar_width = 0.35
index = np.arange(len(groups))
plt.bar(index, means_men, bar_width, label='Men', alpha=0.7,color='blue')
plt.bar(index + bar_width, means_women, bar_width, label='Women', alpha=0.
 ↪7,color='magenta')
plt.xlabel('Groups')
plt.xticks(index + bar_width / 2, groups)
plt.title('Scores by Group and Gender')
plt.legend()
plt.show()
```

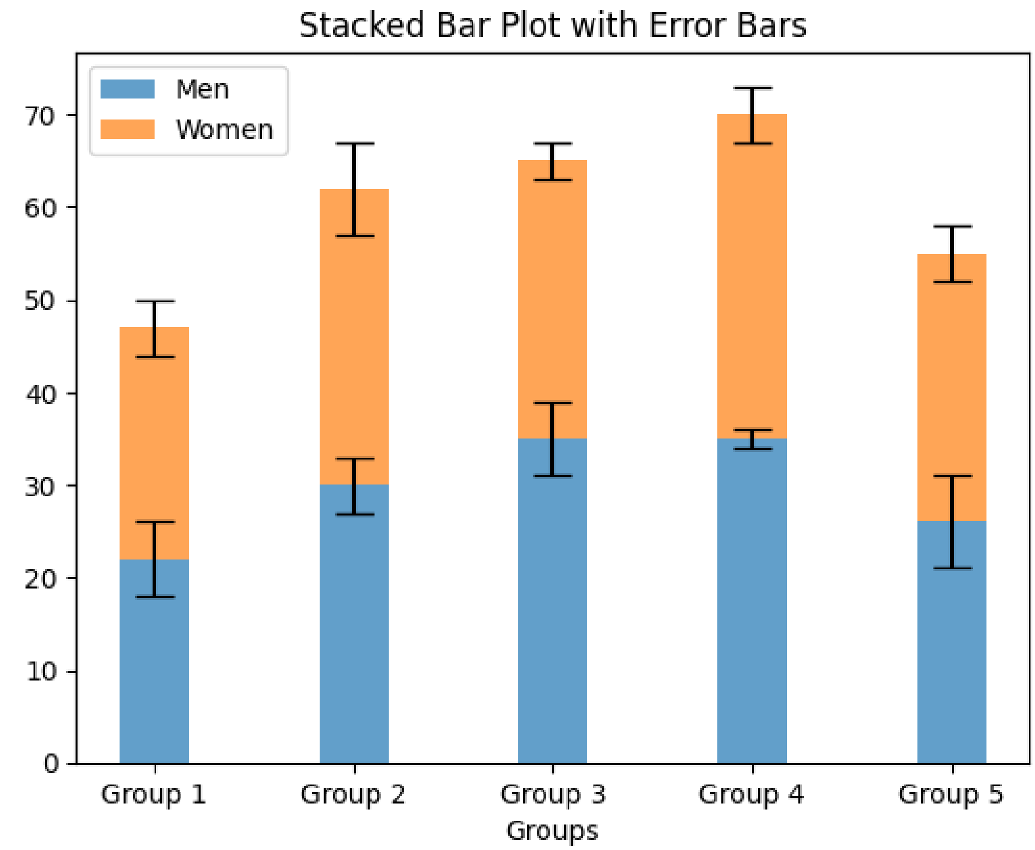


31.Write a Python program to create a stacked bar plot with error bars. Note: Use bottom to stack the women?s bars on top of the men?s bars. Sample Data: Means (men) = (22, 30, 35, 35, 26) Means (women) = (25, 32, 30, 35, 29) Men Standard deviation = (4, 3, 4, 1, 5) Women Standard deviation = (3, 5, 2, 3, 3)

[ ]:

```
import matplotlib.pyplot as plt
import numpy as np
groups = ['Group 1', 'Group 2', 'Group 3', 'Group 4', 'Group 5']
means_men = [22, 30, 35, 35, 26]
means_women = [25, 32, 30, 35, 29]
std_men = [4, 3, 4, 1, 5]
std_women = [3, 5, 2, 3, 3]
bar_width = 0.35
index = np.arange(len(groups))
plt.bar(index, means_men, bar_width, yerr=std_men, label='Men', alpha=0.7,␣
 ↪capsize=7)
plt.bar(index, means_women, bar_width, yerr=std_women, bottom=means_men,␣
 ↪label='Women', alpha=0.7, capsize=7)
```

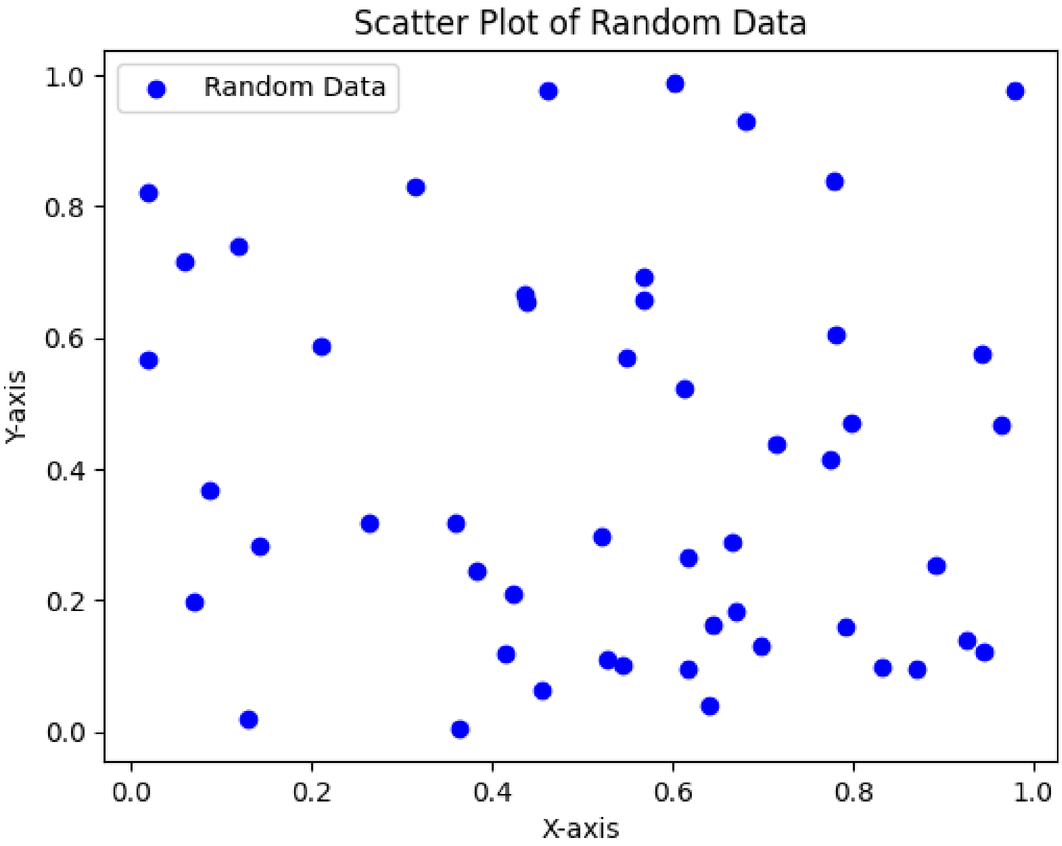
```
plt.xlabel('Groups')
plt.xticks(index, groups)
plt.title('Stacked Bar Plot with Error Bars')
plt.legend()
plt.show()
```



32.Write a Python program to draw a scatter graph taking a random distribution in X and Y and plotted against each other.

[ ]:

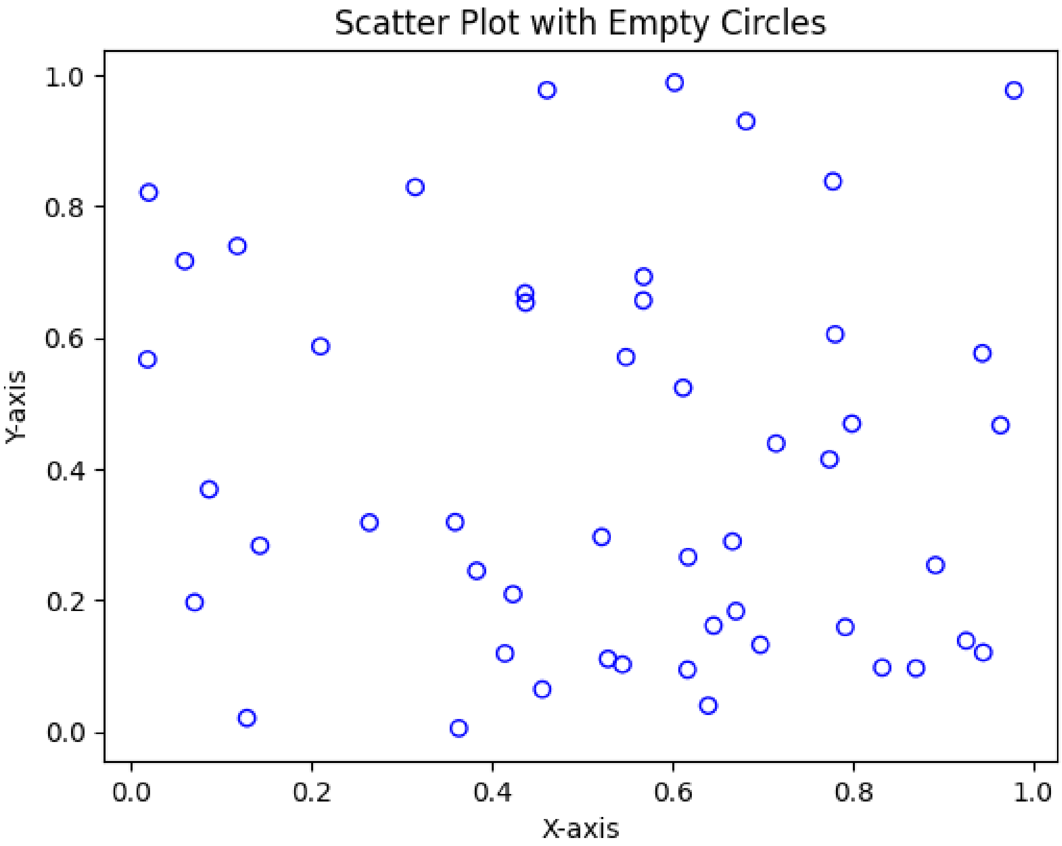
```
import matplotlib.pyplot as plt
import numpy as np
np.random.seed(0)
x = np.random.rand(50)  # 50 random values for X
y = np.random.rand(50)  # 50 random values for Y
plt.scatter(x, y, label='Random Data', color='blue', marker='o')
plt.xlabel('X-axis')
plt.ylabel('Y-axis')
plt.title('Scatter Plot of Random Data')
plt.legend()
plt.show()
```



33. Write a Python program to draw a scatter plot with empty circles taking a random distribution in X and Y and plotted against each other

[ ]:

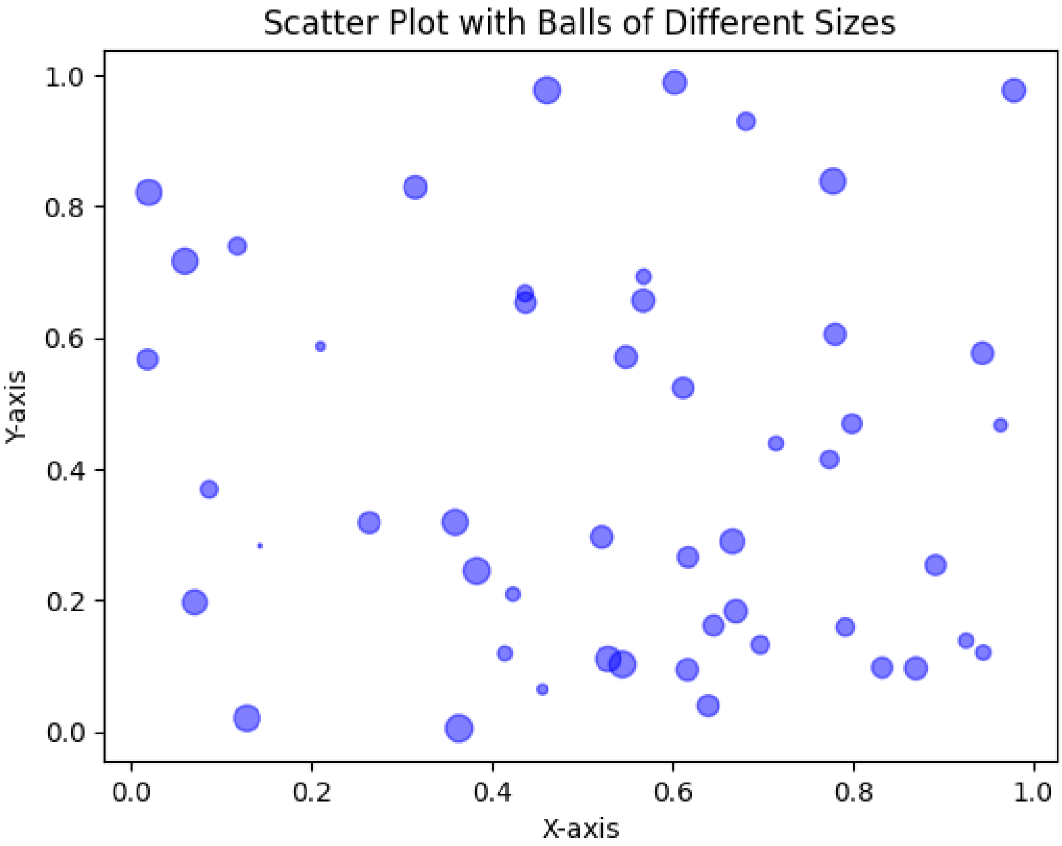
```
import matplotlib.pyplot as plt
import numpy as np
np.random.seed(0)
x = np.random.rand(50)
y = np.random.rand(50)
plt.scatter(x, y, label='Random Data', color='blue', marker='o',␣
  ↪facecolors='none', edgecolors='blue')
plt.xlabel('X-axis')
plt.ylabel('Y-axis')
plt.title('Scatter Plot with Empty Circles')
plt.show()
```



34. Write a Python program to draw a scatter plot using random distributions to generate balls of different sizes

[ ]:

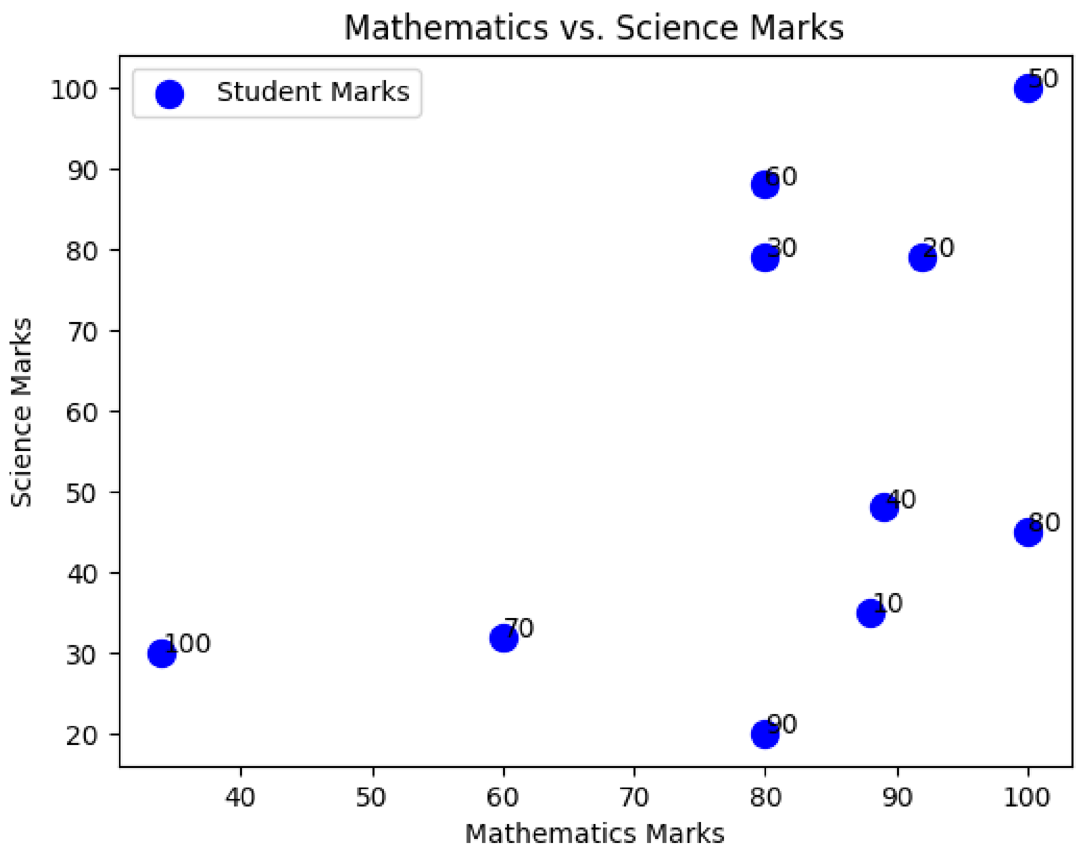
```
import matplotlib.pyplot as plt
import numpy as np
np.random.seed(0)
x = np.random.rand(50)
y = np.random.rand(50)
sizes = np.random.rand(50) * 100
plt.scatter(x, y, s=sizes, label='Random Data', alpha=0.5)
plt.xlabel('X-axis')
plt.ylabel('Y-axis')
plt.title('Scatter Plot with Balls of Different Sizes')
plt.show()
```



35.Write a Python program to draw a scatter plot comparing two subject marks of Mathematics and Science. Use marks of 10 students. Sample data: Test Data: math_marks = [88, 92, 80, 89, 100, 80, 60, 100, 80, 34] science_marks = [35, 79, 79, 48, 100, 88, 32, 45, 20, 30] marks_range = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100]

[ ]:

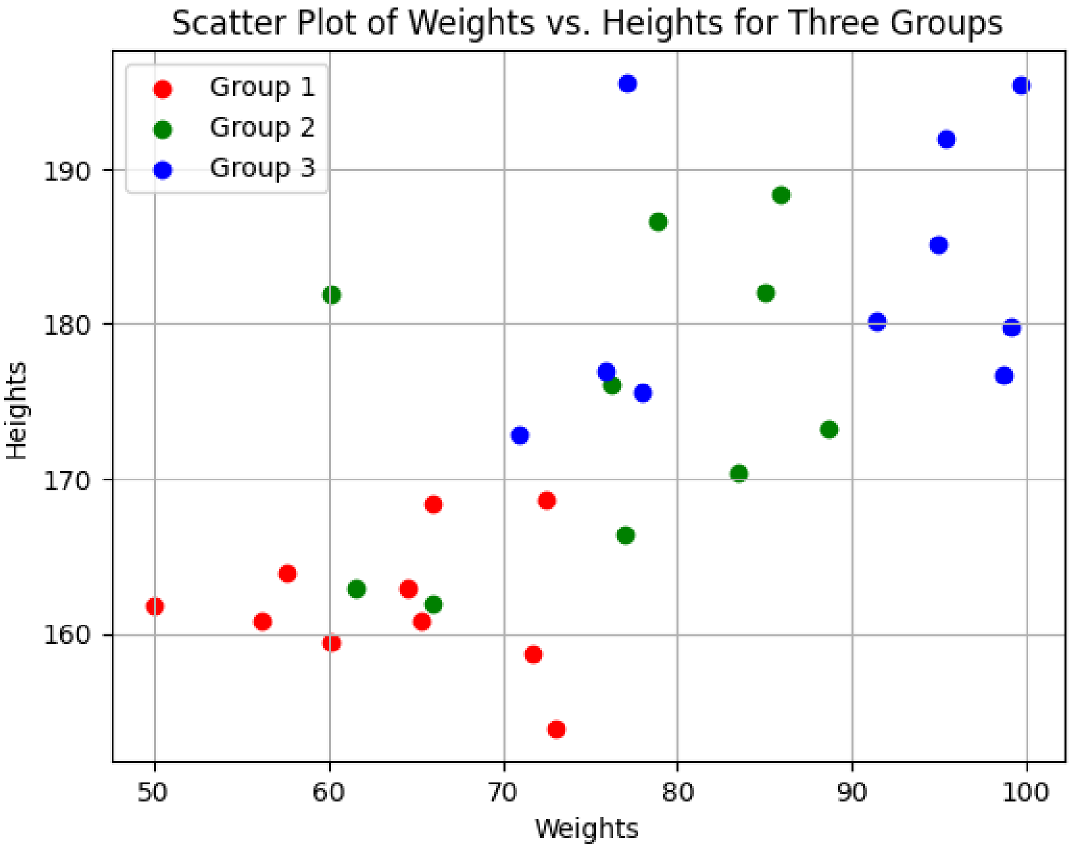
```
import matplotlib.pyplot as plt
math_marks = [88, 92, 80, 89, 100, 80, 60, 100, 80, 34]
science_marks = [35, 79, 79, 48, 100, 88, 32, 45, 20, 30]
marks_range = [10, 20, 30, 40, 50, 60, 70, 80, 90, 100]
plt.scatter(math_marks, science_marks, s=100, color='blue', marker='o',␣
 ↪label='Student Marks')
plt.xlabel('Mathematics Marks')
plt.ylabel('Science Marks')
plt.title('Mathematics vs. Science Marks')
for i, txt in enumerate(marks_range):
    plt.annotate(txt, (math_marks[i], science_marks[i]))

plt.legend()
plt.show()
```



36. Write a Python program to draw a scatter plot for three different groups comparing weights and heights

[ ]:

```python
import matplotlib.pyplot as plt
import random
group1_weights = [random.uniform(50, 80) for _ in range(10)]
group1_heights = [random.uniform(150, 180) for _ in range(10)]

group2_weights = [random.uniform(60, 90) for _ in range(10)]
group2_heights = [random.uniform(160, 190) for _ in range(10)]

group3_weights = [random.uniform(70, 100) for _ in range(10)]
group3_heights = [random.uniform(170, 200) for _ in range(10)]
plt.scatter(group1_weights, group1_heights, label='Group 1', color='red')
plt.scatter(group2_weights, group2_heights, label='Group 2', color='green')
plt.scatter(group3_weights, group3_heights, label='Group 3', color='blue')
plt.xlabel('Weights')
plt.ylabel('Heights')
plt.title('Scatter Plot of Weights vs. Heights for Three Groups')
plt.legend()
plt.grid(True)
plt.show()
```



37.Write a Pandas program to create a dataframe from a dictionary and display it. Sample data: {'X':[78,85,96,80,86], 'Y':[84,94,89,83,86],'Z':[86,97,96,72,83]}

```
[ ]: import pandas as pd
     data = {'X': [78, 85, 96, 80, 86], 'Y': [84, 94, 89, 83, 86], 'Z': [86, 97, 96,␣
      ↪72, 83]}
     df = pd.DataFrame(data)
     print(df)
```

```
    X   Y   Z
0  78  84  86
1  85  94  97
2  96  89  96
3  80  83  72
4  86  86  83
```

38.Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels. Sample Python dictionary data and list labels:

exam_data = {‘name’: [‘Anastasia’, ‘Dima’, ‘Katherine’, ‘James’, ‘Emily’, ‘Michael’, ‘Matthew’, ‘Laura’, ‘Kevin’, ‘Jonas’], ‘score’: [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19], ‘attempts’: [1, 3, 2, 3, 2, 3, 1, 1, 2, 1], ‘qualify’: [‘yes’, ‘no’, ‘yes’, ‘no’, ‘no’, ‘yes’, ‘yes’, ‘no’, ‘no’, ‘yes’]} labels = [‘a’, ‘b’, ‘c’, ‘d’, ‘e’, ‘f’, ‘g’, ‘h’, ‘i’, ‘j’]

[ ]:

```
import pandas as pd
import numpy as np
exam_data = {
    'name': ['Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael',␣
  ↪'Matthew', 'Laura', 'Kevin', 'Jonas'],
    'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19],
    'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1],
    'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']
}
labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']
df = pd.DataFrame(exam_data, index=labels)
print(df)
```

```
        name  score  attempts qualify
a  Anastasia   12.5         1     yes
b       Dima    9.0         3      no
c  Katherine   16.5         2     yes
d      James    NaN         3      no
e      Emily    9.0         2      no
f    Michael   20.0         3     yes
g    Matthew   14.5         1     yes
h      Laura    NaN         1      no
i      Kevin    8.0         2      no
j      Jonas   19.0         1     yes
```

39.Write a Pandas program to get the first 3 rows of a given DataFrame. Sample Python dictionary data and list labels: exam_data = {‘name’: [‘Anastasia’, ‘Dima’, ‘Katherine’, ‘James’, ‘Emily’, ‘Michael’, ‘Matthew’, ‘Laura’, ‘Kevin’, ‘Jonas’], ‘score’: [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19], ‘attempts’: [1, 3, 2, 3, 2, 3, 1, 1, 2, 1], ‘qualify’: [‘yes’, ‘no’, ‘yes’, ‘no’, ‘no’, ‘yes’, ‘yes’, ‘no’, ‘no’, ‘yes’]} labels = [‘a’, ‘b’, ‘c’, ‘d’, ‘e’, ‘f’, ‘g’, ‘h’, ‘i’, ‘j’]

[ ]:

```
import pandas as pd
import numpy as np
exam_data = {
    'name': ['Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael',␣
  ↪'Matthew', 'Laura', 'Kevin', 'Jonas'],
    'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19],
    'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1],
    'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']
}
labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']
df = pd.DataFrame(exam_data, index=labels)
```

```
first_3_rows = df.head(3)
print(first_3_rows)
```

```
        name  score  attempts qualify
a  Anastasia   12.5         1     yes
b       Dima    9.0         3      no
c  Katherine   16.5         2     yes
```

40. Write a Pandas program to select the ‘name’ and ‘score’ columns from the following DataFrame. Sample Python dictionary data and list labels: exam_data = {‘name’: [‘Anastasia’, ‘Dima’, ‘Katherine’, ‘James’, ‘Emily’, ‘Michael’, ‘Matthew’, ‘Laura’, ‘Kevin’, ‘Jonas’], ‘score’: [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19], ‘attempts’: [1, 3, 2, 3, 2, 3, 1, 1, 2, 1], ‘qualify’: [‘yes’, ‘no’, ‘yes’, ‘no’, ‘no’, ‘yes’, ‘yes’, ‘no’, ‘no’, ‘yes’]} labels = [‘a’, ‘b’, ‘c’, ‘d’, ‘e’, ‘f’, ‘g’, ‘h’, ‘i’, ‘j’]

[ ]:

```
import pandas as pd
import numpy as np
exam_data = {
    'name': ['Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael',␣
  ↪'Matthew', 'Laura', 'Kevin', 'Jonas'],
    'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19],
    'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1],
    'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']
}
labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']
df = pd.DataFrame(exam_data, index=labels)
selected_columns = df[['name', 'score']]
print(selected_columns)
```

```
        name  score
a  Anastasia   12.5
b       Dima    9.0
c  Katherine   16.5
d      James    NaN
e      Emily    9.0
f    Michael   20.0
g    Matthew   14.5
h      Laura    NaN
i      Kevin    8.0
j      Jonas   19.0
```