DSA0508 Query Processing for Data Science with data exploration

LAB QUESTIONS

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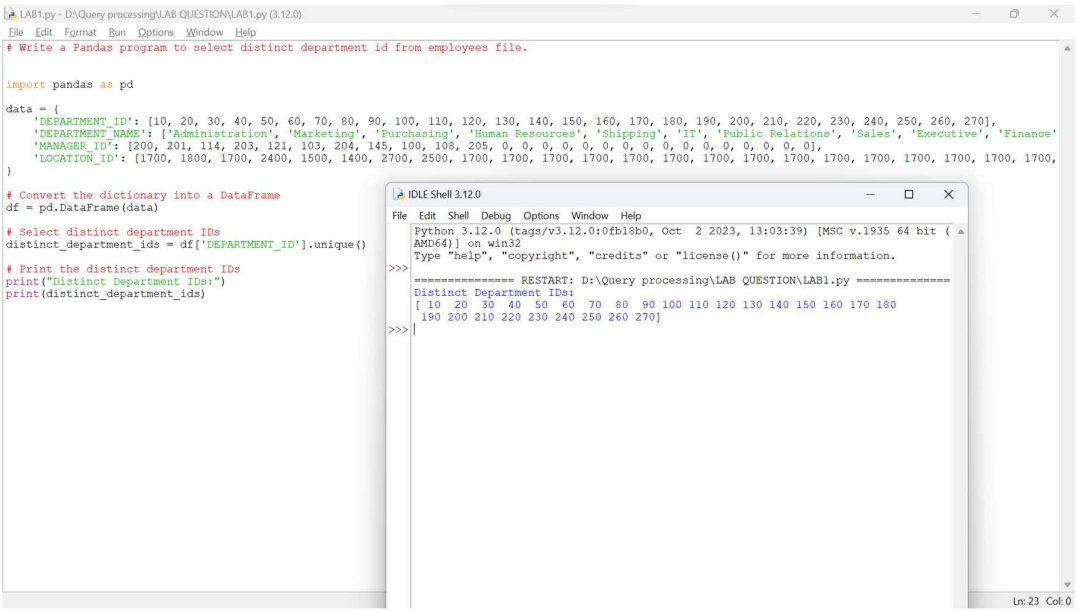
1. Write a Pandas program to select distinct department id from employee's file.

CODE:

```
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]

}

# Convert the dictionary into a DataFrame

df = pd.DataFrame(data)

# Select distinct department IDs

distinct_department_ids = df['DEPARTMENT_ID'].unique()

# Print the distinct department IDs

print("Distinct Department IDs:")

print(distinct_department_ids)
```



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

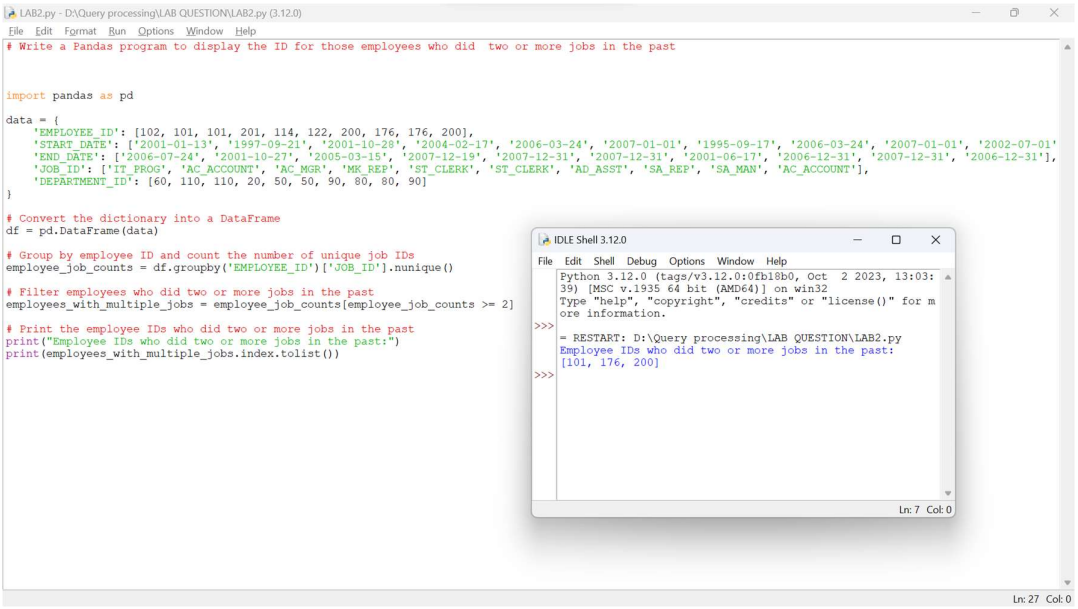
CODE:

```
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]

}

# Convert the dictionary into a DataFrame

df = pd.DataFrame(data

# Group by employee ID and count the number of unique job IDs

employee_job_counts = df.groupby('EMPLOYEE_ID')['JOB_ID'].nunique()

# Filter employees who did two or more jobs in the past

employees_with_multiple_jobs = employee_job_counts[employee_job_counts >= 2]
```

 # Print the employee IDs who did two or more jobs in the past

print("Employee IDs who did two or more jobs in the past:")

print(employees_with_multiple_jobs.index.tolist())



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

CODE:

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]

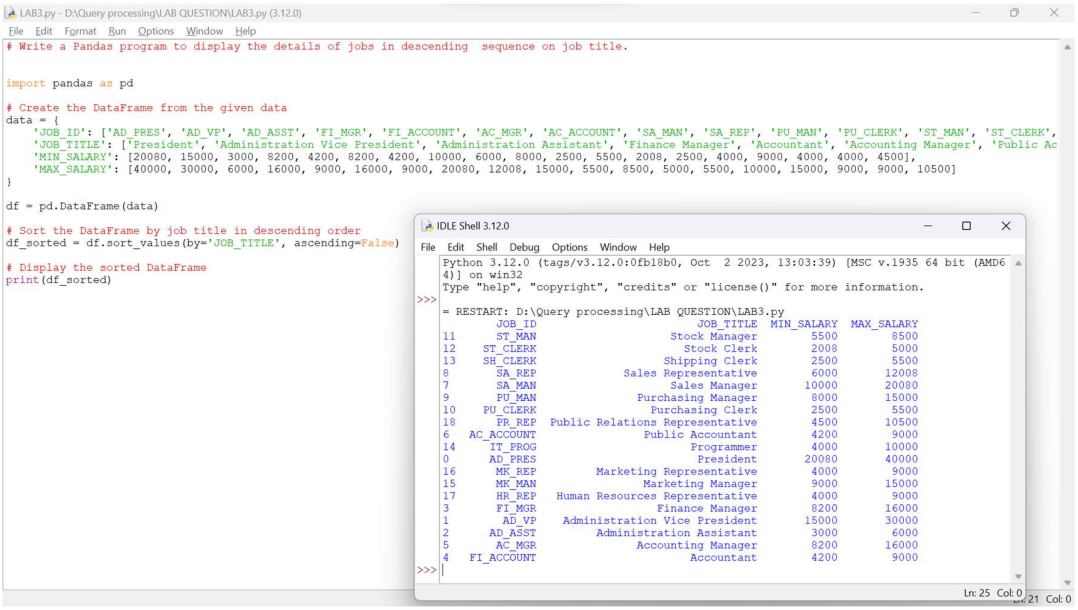
}

df = pd.DataFrame(data)

 # Sort the DataFrame by job title in descending order

df_sorted = df.sort_values(by='JOB_TITLE', ascending=False)

print(df_sorted)



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

CODE:

import pandas as pd

import matplotlib.pyplot as plt

import numpy as np

start_date = '2024-01-01'

end_date = '2024-02-21'

num_dates = 21

date_range = pd.date_range(start=start_date, end=end_date, periods=num_dates)

prices = [100, 110, 105, 115, 120, 118, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195]

stock_data = pd.DataFrame({'Date': date_range, 'Price': prices})

stock_data.plot(kind='line', x='Date', y='Price', figsize=(10, 6), color='blue')

plt.title('Historical Stock Prices of Alphabet Inc.')

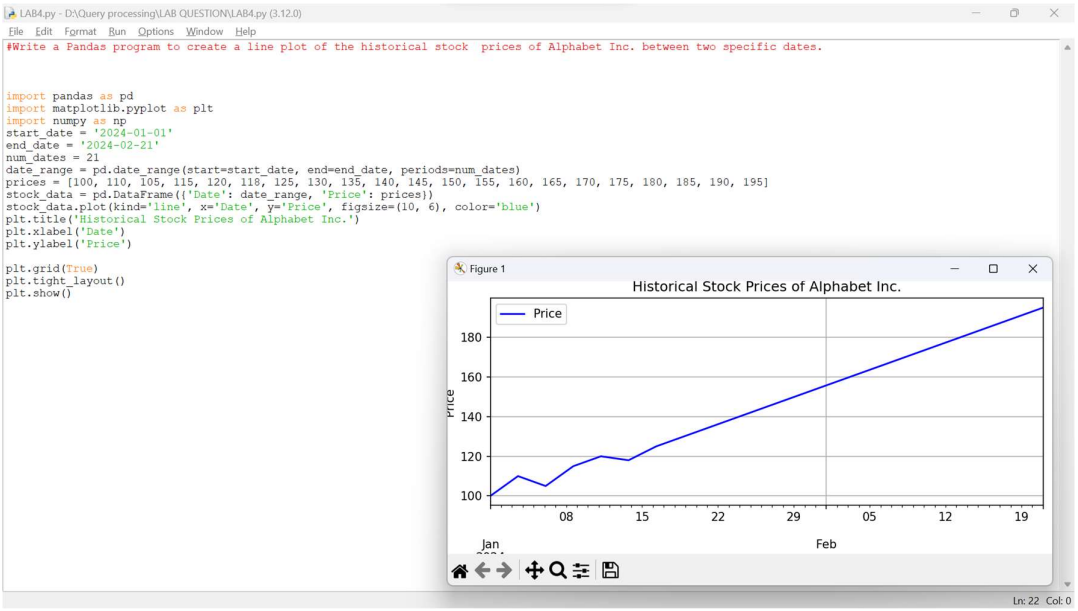
plt.xlabel('Date')

plt.ylabel('Price')

plt.grid(True)

plt.tight_layout()

plt.show()



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

CODE:

import pandas as pd

import matplotlib.pyplot as plt

import numpy as np

start_date = '2024-01-01'

end_date = '2024-02-21'

num_dates = 21

date_range = pd.date_range(start=start_date, end=end_date, periods=num_dates)

volumes = [50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150]

volume_data = pd.DataFrame({'Date': date_range, 'Volume': volumes})

plt.figure(figsize=(10, 6))

plt.bar(volume_data['Date'], volume_data['Volume'], color='green')

plt.title('Trading Volume of Alphabet Inc.')

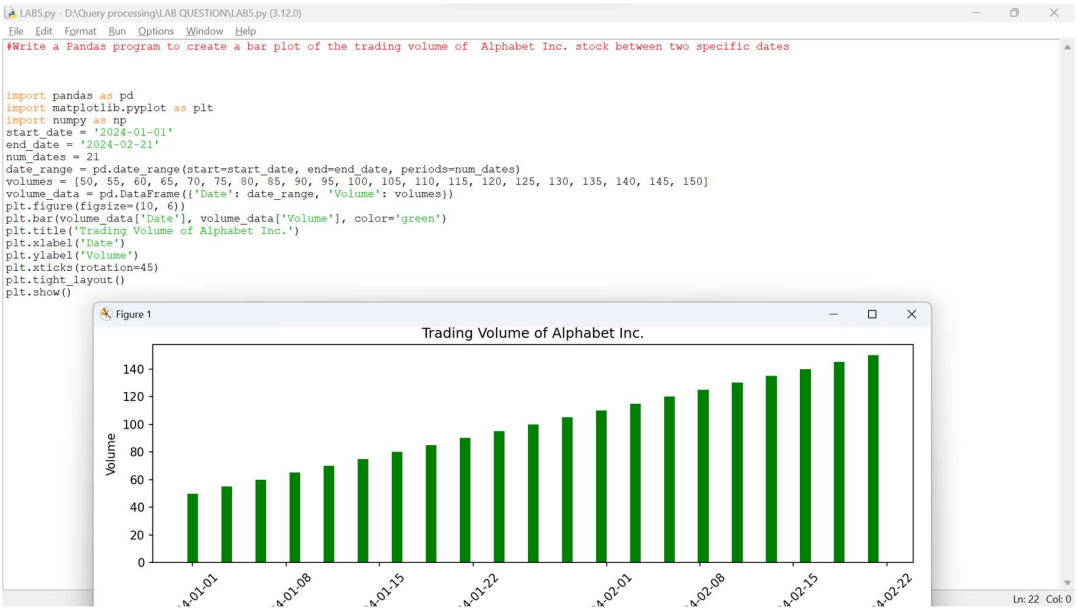
plt.xlabel('Date')

plt.ylabel('Volume')

plt.xticks(rotation=45)

plt.tight_layout()

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.

CODE:

import pandas as pd

import matplotlib.pyplot as plt

start_date = '2024-01-01'

end_date = '2024-02-21'

num_dates = 21

date_range = pd.date_range(start=start_date, end=end_date, periods=num_dates)

prices = [100, 110, 105, 115, 120, 118, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195]

volumes = [50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150]

stock_data = pd.DataFrame({'Date': date_range, 'Price': prices, 'Volume': volumes})

start_date = '2024-01-10'

end_date = '2024-02-10'

filtered_data = stock_data[(stock_data['Date'] >= start_date) & (stock_data['Date'] <= end_date)]

plt.figure(figsize=(10, 6))

plt.scatter(filtered_data['Price'], filtered_data['Volume'], color='blue')

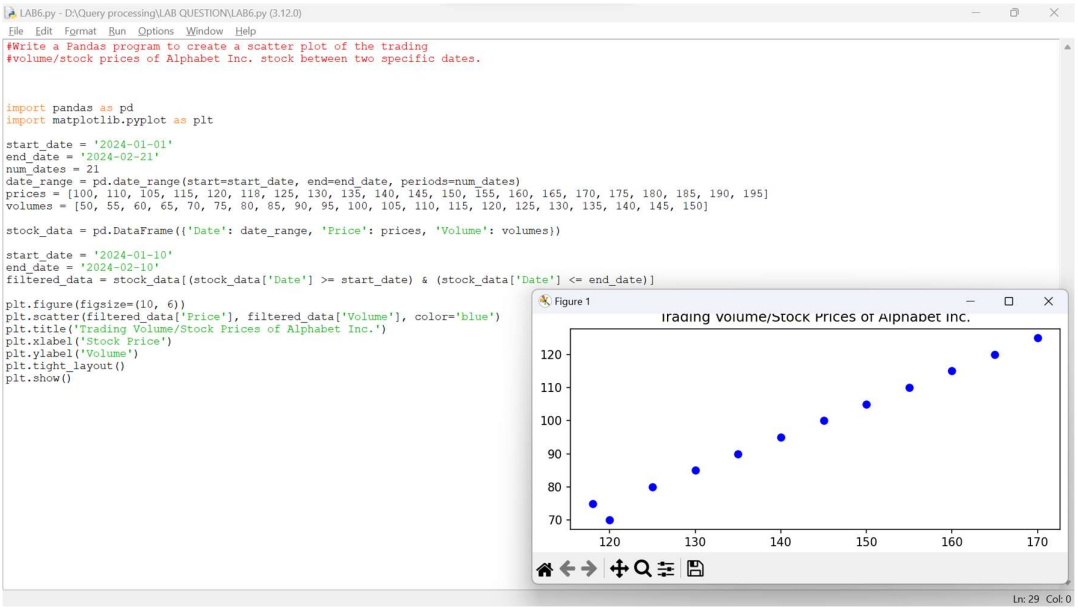
plt.title('Trading Volume/Stock Prices of Alphabet Inc.')

plt.xlabel('Stock Price')

plt.ylabel('Volume')

plt.tight_layout()

plt.show()



7, Write a Pandas program to create a Pivot table and find the maximum and minimum sale value of the items.

CODE:

import pandas as pd

data = {

'Item': ['A', 'B', 'A', 'B', 'A', 'B'],

'Date': ['2023-01-01', '2023-01-01', '2023-01-02', '2023-01-02', '2023-01-03', '2023-01-03'],

'Sale': [100, 150, 120, 130, 110, 160]

}

sales_data = pd.DataFrame(data)

sales_data['Date'] = pd.to_datetime(sales_data['Date'])

pivot_table = pd.pivot_table(sales_data, values='Sale', index='Item', aggfunc=['max', 'min'])

pivot_table.columns = ['Max Sale', 'Min Sale']

print("Pivot Table:")

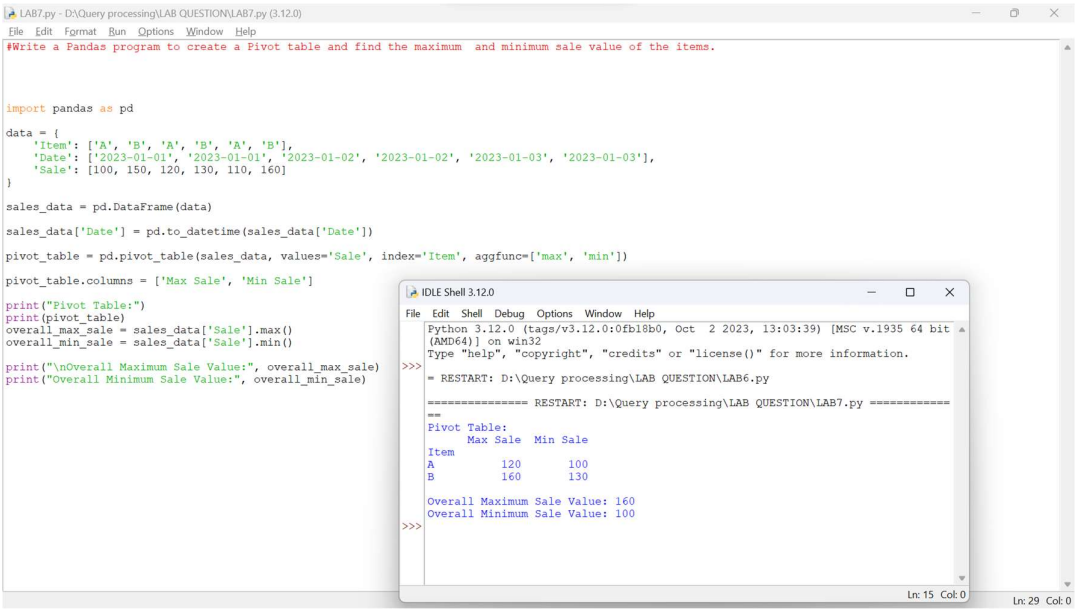
print(pivot_table)

overall_max_sale = sales_data['Sale'].max()

overall_min_sale = sales_data['Sale'].min()

print("\nOverall Maximum Sale Value:", overall_max_sale)

print("Overall Minimum Sale Value:", overall_min_sale)



8, Write a Pandas program to create a Pivot table and find the item wise unit sold

CODE:

import pandas as pd

data = {

'Item': ['A', 'B', 'A', 'B', 'A', 'B'],

'Date': ['2023-01-01', '2023-01-01', '2023-01-02', '2023-01-02', '2023-01-03', '2023-01-03'],

'Unit Sold': [10, 15, 12, 13, 11, 16]

}

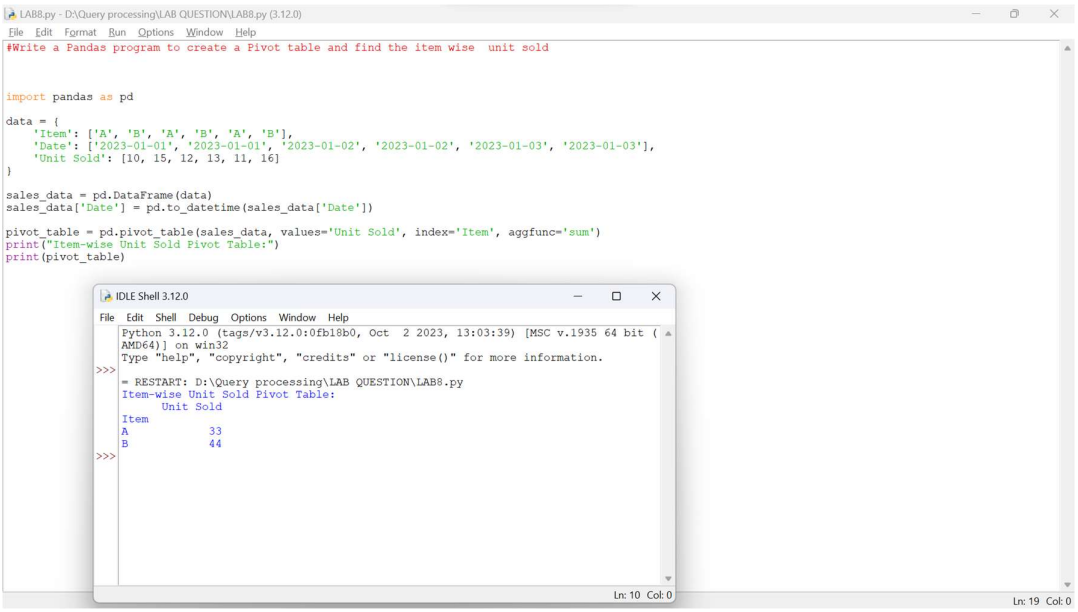
sales_data = pd.DataFrame(data)

sales_data['Date'] = pd.to_datetime(sales_data['Date'])

pivot_table = pd.pivot_table(sales_data, values='Unit Sold', index='Item', aggfunc='sum')

print("Item-wise Unit Sold Pivot Table:")

print(pivot_table)



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

CODE:

```
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]
```

}

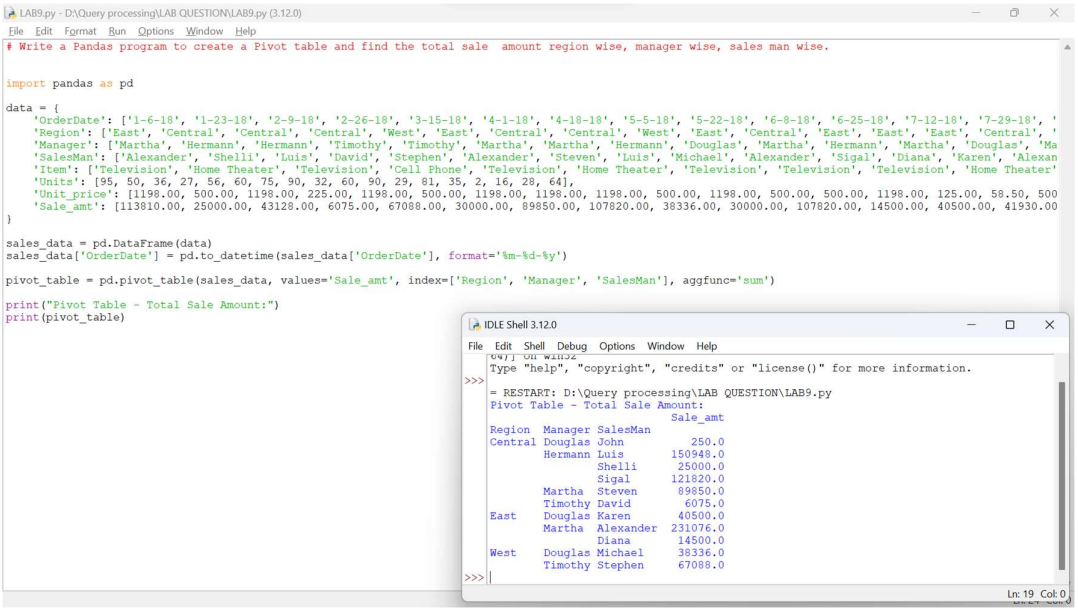
sales_data = pd.DataFrame(data)

sales_data['OrderDate'] = pd.to_datetime(sales_data['OrderDate'], format='%m-%d-%y')

pivot_table = pd.pivot_table(sales_data, values='Sale_amt', index=['Region', 'Manager', 'SalesMan'], aggfunc='sum')

print("Pivot Table - Total Sale Amount:")

print(pivot_table)



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.

CODE:

import pandas as pd

import numpy as n

np.random.seed(42)

data = np.random.randn(10, 4)

df = pd.DataFrame(data, columns=['A', 'B', 'C', 'D'])

 # Define a function to apply color based on the sign of the number

def color_negative_red(val):

    color = 'red' if val < 0 else 'black'

    return f'{val:.3f}'

 # Apply the style to the DataFrame

styled_df = df.applymap(color_negative_red)

 # Convert the styled DataFrame to HTML

```
styled_html = styled_df.to_html(escape=False, index=False)

# Save the HTML output to a file

with open('styled_table.html', 'w') as f:

    f.write(styled_html)

print("HTML table saved to 'styled_table.html'")
```

OUTPUT:

A	B	C	D
0.497	-0.138	0.648	1.523
-0.234	-0.234	1.579	0.767
-0.469	0.543	-0.463	-0.466
0.242	-1.913	-1.725	-0.562
-1.013	0.314	-0.908	-1.412
1.466	-0.226	0.068	-1.425
-0.544	0.111	-1.151	0.376
-0.601	-0.292	-0.602	1.852
-0.013	-1.058	0.823	-1.221
0.209	-1.960	-1.328	0.197

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

CODE:

```
import pandas as pd

import numpy as np

np.random.seed(24)

df = pd.DataFrame({'A': np.linspace(1, 10, 10)})

df = pd.concat([df, pd.DataFrame(np.random.randn(10, 4), columns=list('BCDE'))], axis=1)

# Introducing NaN values

df.iloc[0, 2] = np.nan

df.iloc[3, 3] = np.nan

df.iloc[4, 1] = np.nan

df.iloc[9, 4] = np.nan

# Function to highlight NaN values in red

def highlight_null(val):

    color = 'red' if pd.isnull(val) else 'black'
```

```
    return 'color: %s' % color
```

 # Apply styling to DataFrame

```
styled_df = df.style.applymap(highlight_null)
```

 # Save styled DataFrame to an HTML file

```
styled_df.to_html('styled_dataframe.html', na_rep='')
print("HTML output saved to 'styled_dataframe.html'")
```

OUTPUT:

	A	B	C	D	E
0	1.000000	1.329212	nan	-0.316280	-0.990810
1	2.000000	-1.070816	-1.438713	0.564417	0.295722
2	3.000000	-1.626404	0.219565	0.678805	1.889273
3	4.000000	0.961538	0.104011	nan	0.850229
4	5.000000	nan	1.057737	0.165562	0.515018
5	6.000000	-1.336936	0.562861	1.392855	-0.063328
6	7.000000	0.121668	1.207603	-0.002040	1.627796
7	8.000000	0.354493	1.037528	-0.385684	0.519818
8	9.000000	1.686583	-1.325963	1.428984	-2.089354
9	10.000000	-0.129820	0.631523	-0.586538	nan

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.

CODE:

```
import pandas as pd
import numpy as np
```

 # Create a DataFrame with ten rows and four columns with random values

```
data = np.random.rand(10, 4)
columns = ['Column1', 'Column2', 'Column3', 'Column4']
df = pd.DataFrame(data, columns=columns)
```

 # Convert the DataFrame to strings with HTML-style formatting

```
def html_style(x):
    return f'<span style="background-color:black; color:yellow;">{x:.4f}</span>'
formatted_df = df.applymap(html_style)
```

 # Save the HTML-formatted DataFrame to a file

```
html_file = 'formatted_df.html'
formatted_df.to_html(html_file, escape=False)
```

 # Open the HTML file in the default web browser

import webbrowser

webbrowser.open(html_file)

OUTPUT:

	Column1	Column2	Column3	Column4
0	0.2953	0.4267	0.1210	0.8683
1	0.0667	0.8619	0.8847	0.3478
2	0.1344	0.0886	0.6610	0.0741
3	0.4103	0.8144	0.3893	0.9763
4	0.1949	0.3023	0.9131	0.0204
5	0.1031	0.5901	0.0189	0.6667
6	0.3881	0.3465	0.7506	0.1004
7	0.4405	0.7628	0.8371	0.5164
8	0.8372	0.6094	0.6127	0.6558
9	0.0641	0.5441	0.1576	0.6028

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

CODE:

import pandas as pd

import numpy as np

 # Creating the DataFrame with missing values

data = {'ord_no': [70001.0, np.nan, 70002.0, 70004.0, np.nan, 70005.0, np.nan, 70010.0, 70003.0, 70012.0, np.nan, 70013.0],

'purch_amt': [150.50, 270.65, 65.26, 110.50, 948.50, 2400.60, 5760.00, 1983.43, 2480.40, 250.45, 75.29, 3045.60],

'ord_date': ['2012-10-05', '2012-09-10', np.nan, '2012-08-17', '2012-09-10', '2012-07-27', '2012-09-10', '2012-10-10', '2012-10-10', '2012-06-27', '2012-08-17', '2012-04-25'],

'customer_id': [3002, 3001, 3001, 3003, 3002, 3001, 3001, 3004, 3003, 3002, 3001, 3001],

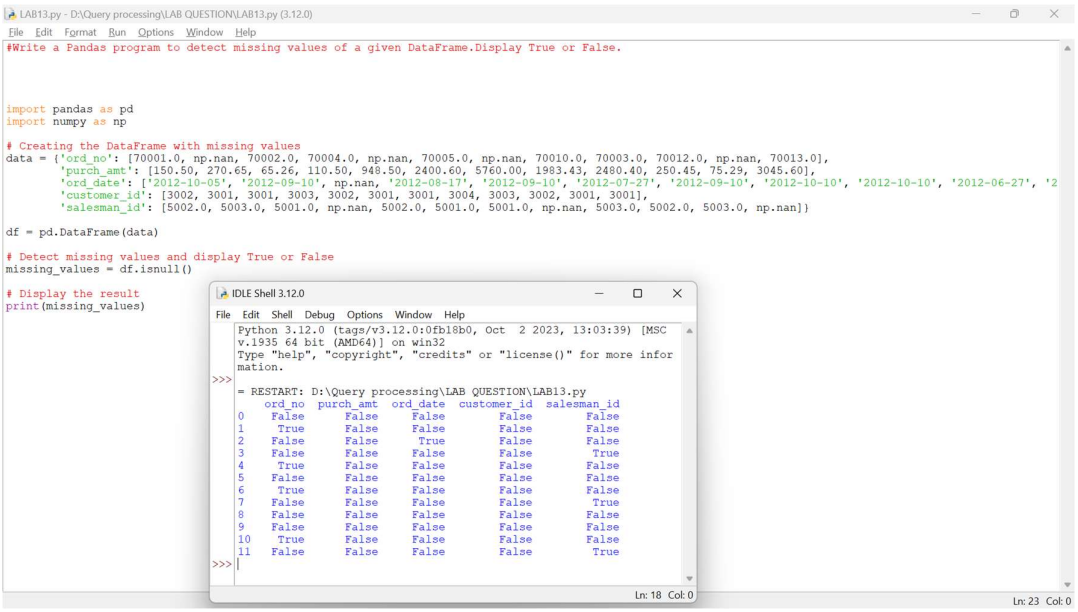
'salesman_id': [5002.0, 5003.0, 5001.0, np.nan, 5002.0, 5001.0, 5001.0, np.nan, 5003.0, 5002.0, 5003.0, np.nan]}

df = pd.DataFrame(data)

 # Detect missing values and display True or False

missing_values = df.isnull()

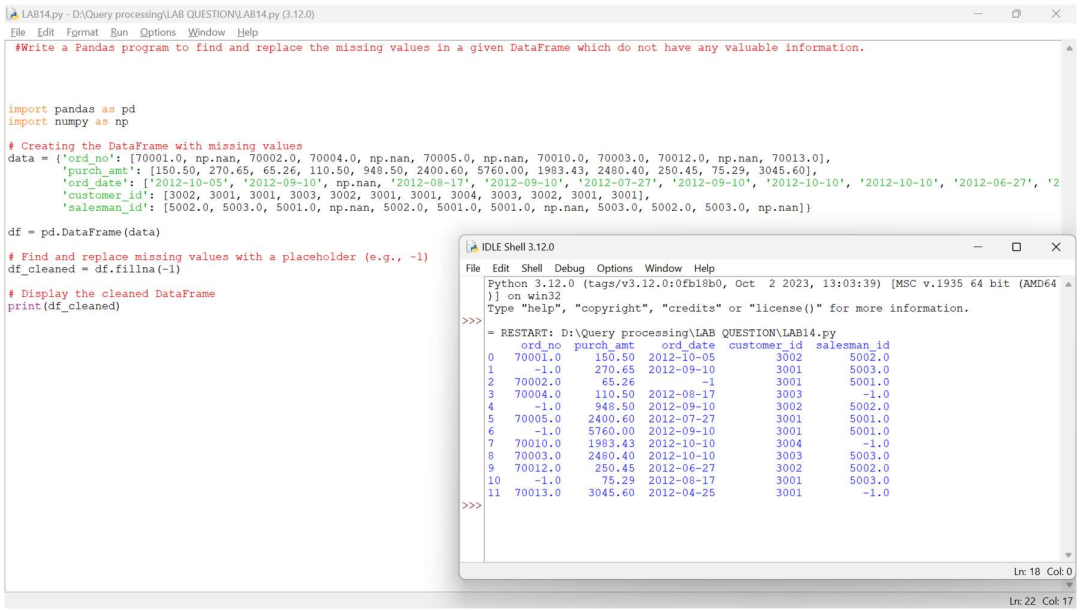
print(missing_values)



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

CODING:

```
import pandas as pd

import numpy as np

data = {'ord_no': [70001.0, np.nan, 70002.0, 70004.0, np.nan, 70005.0, np.nan, 70010.0, 70003.0, 70012.0, np.nan, 70013.0],

        'purch_amt': [150.50, 270.65, 65.26, 110.50, 948.50, 2400.60, 5760.00, 1983.43, 2480.40, 250.45, 75.29, 3045.60],

        'ord_date': ['2012-10-05', '2012-09-10', np.nan, '2012-08-17', '2012-09-10', '2012-07-27', '2012-09-10', '2012-10-10', '2012-10-10', '2012-06-27', '2012-08-17', '2012-04-25'],

        'customer_id': [3002, 3001, 3001, 3003, 3002, 3001, 3001, 3004, 3003, 3002, 3001, 3001],

        'salesman_id': [5002.0, 5003.0, 5001.0, np.nan, 5002.0, 5001.0, 5001.0, np.nan, 5003.0, 5002.0, 5003.0, np.nan]}

df = pd.DataFrame(data)

# Find and replace missing values with a placeholder (e.g., -1)

df_cleaned = df.fillna(-1)

print(df_cleaned)
```



15, Write a Pandas program to keep the rows with at least 2 NaN values

CODE:

import pandas as pd

import numpy as np

data = {'ord_no': [70001.0, np.nan, 70002.0, 70004.0, np.nan, 70005.0, np.nan, 70010.0, 70003.0, 70012.0, np.nan, 70013.0],

'purch_amt': [150.50, 270.65, 65.26, 110.50, 948.50, 2400.60, 5760.00, 1983.43, 2480.40, 250.45, 75.29, 3045.60],

'ord_date': ['2012-10-05', '2012-09-10', np.nan, '2012-08-17', '2012-09-10', '2012-07-27', '2012-09-10', '2012-10-10', '2012-10-10', '2012-06-27', '2012-08-17', '2012-04-25'],

'customer_id': [3002, 3001, 3001, 3003, 3002, 3001, 3001, 3004, 3003, 3002, 3001, 3001],

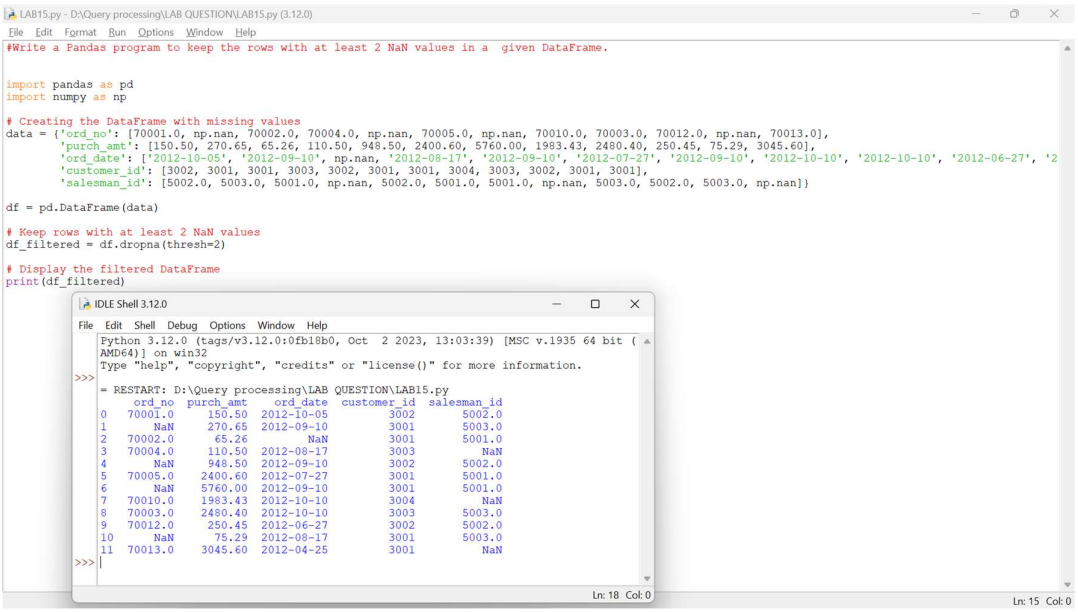
'salesman_id': [5002.0, 5003.0, 5001.0, np.nan, 5002.0, 5001.0, 5001.0, np.nan, 5003.0, 5002.0, 5003.0, np.nan]}

df = pd.DataFrame(data)

Keep rows with at least 2 NaN values

df_filtered = df.dropna(thresh=2)

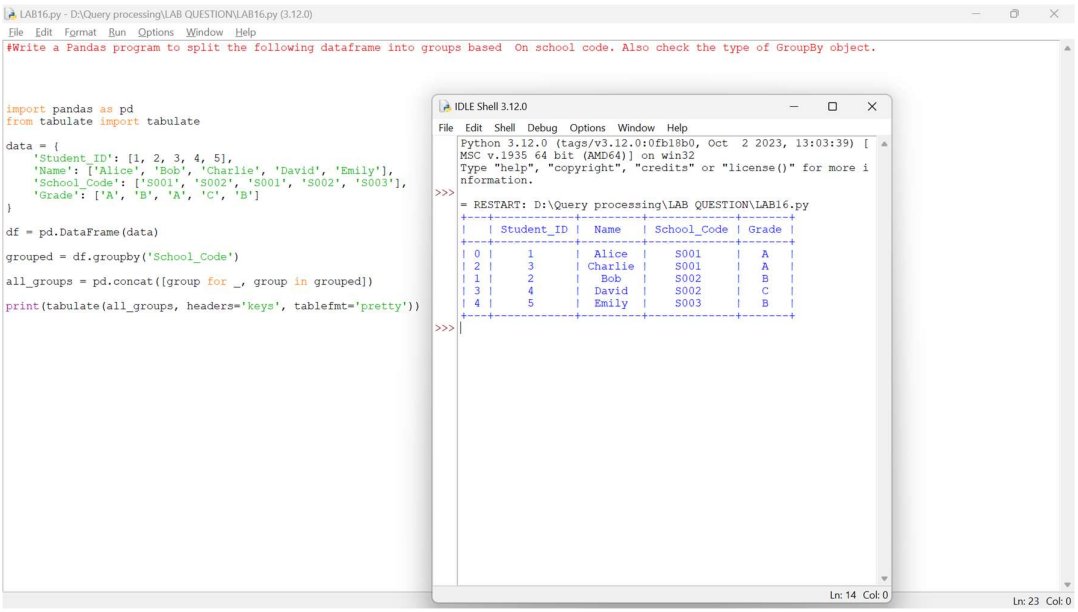
print(df_filtered)



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

CODE:

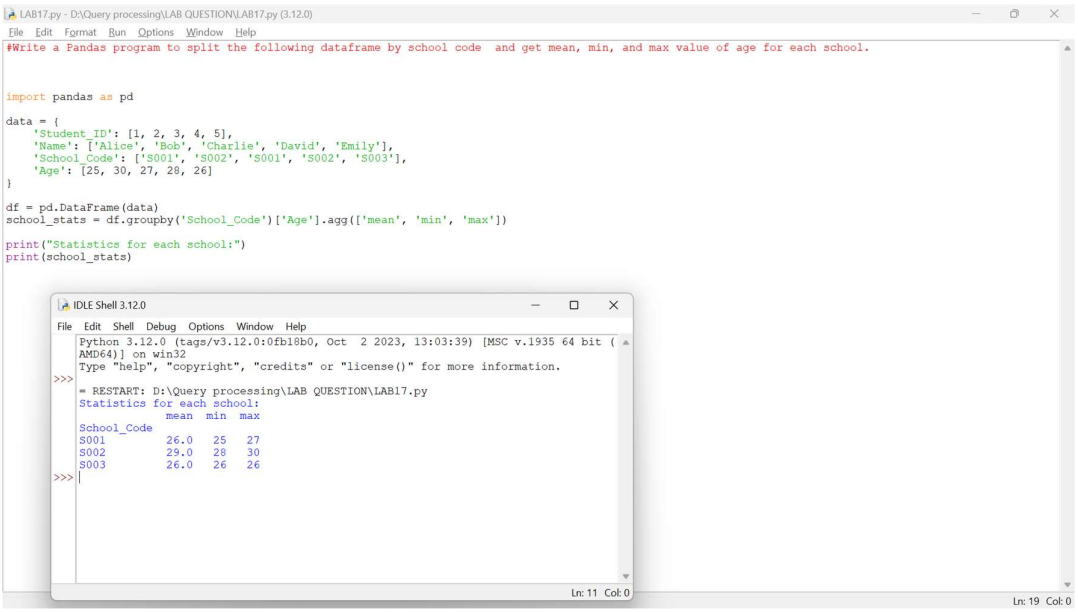
```
import pandas as pd
from tabulate import tabulate
data = {
    'Student_ID': [1, 2, 3, 4, 5],
    'Name': ['Alice', 'Bob', 'Charlie', 'David', 'Emily'],
    'School_Code': ['S001', 'S002', 'S001', 'S002', 'S003'],
    'Grade': ['A', 'B', 'A', 'C', 'B']
}
df = pd.DataFrame(data)
grouped = df.groupby('School_Code')
all_groups = pd.concat([group for _, group in grouped])
print(tabulate(all_groups, headers='keys', tablefmt='pretty'))
```



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.

CODE:

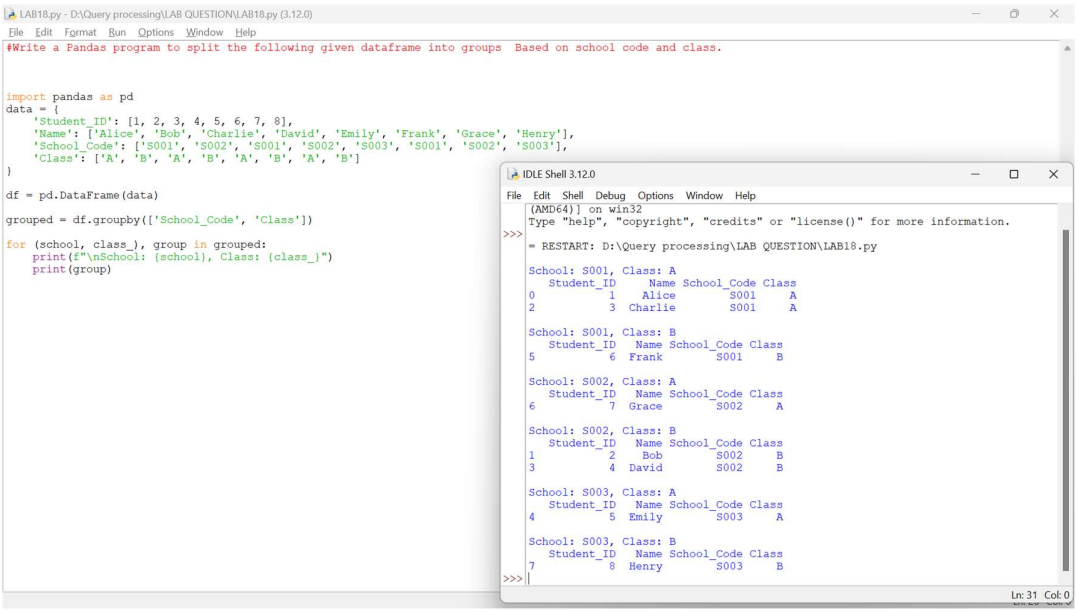
```
import pandas as pd

data = {

   'Student_ID': [1, 2, 3, 4, 5],

   'Name': ['Alice', 'Bob', 'Charlie', 'David', 'Emily'],

   'School_Code': ['S001', 'S002', 'S001', 'S002', 'S003'],

   'Age': [25, 30, 27, 28, 26]

}

df = pd.DataFrame(data)

school_stats = df.groupby('School_Code')['Age'].agg(['mean', 'min', 'max'])

print("Statistics for each school:")

print(school_stats)
```



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

CODE:

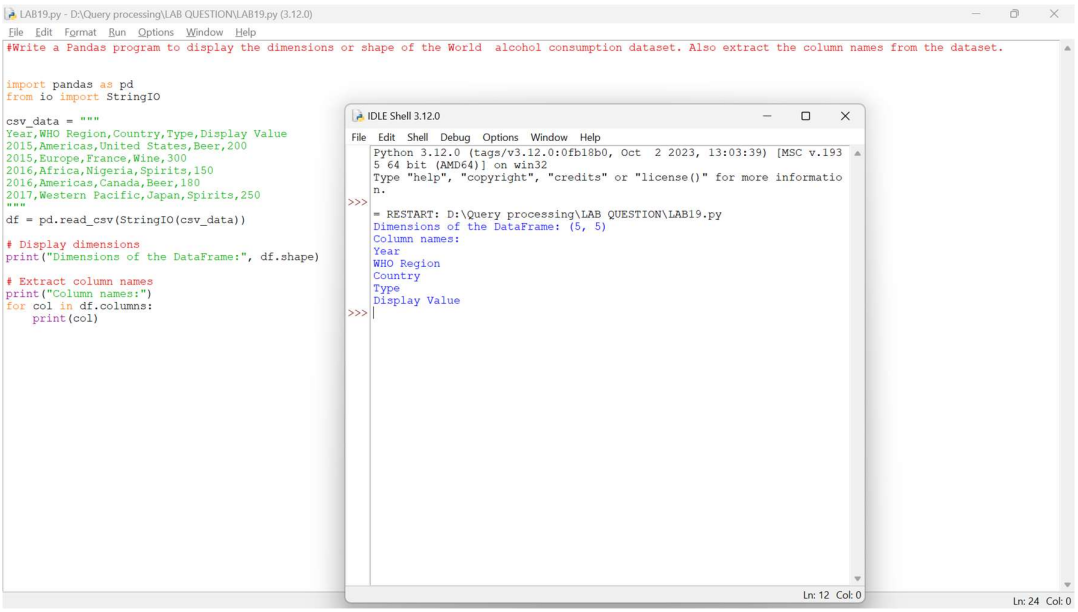
```
import pandas as pd
data = {
    'Student_ID': [1, 2, 3, 4, 5, 6, 7, 8],
    'Name': ['Alice', 'Bob', 'Charlie', 'David', 'Emily', 'Frank', 'Grace', 'Henry'],
    'School_Code': ['S001', 'S002', 'S001', 'S002', 'S003', 'S001', 'S002', 'S003'],
    'Class': ['A', 'B', 'A', 'B', 'A', 'B', 'A', 'B']
}\
df = pd.DataFrame(data)
grouped = df.groupby(['School_Code', 'Class'])
for (school, class_), group in grouped:
    print(f"\nSchool: {school}, Class: {class_}")
    print(group)
```



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.

CODE:

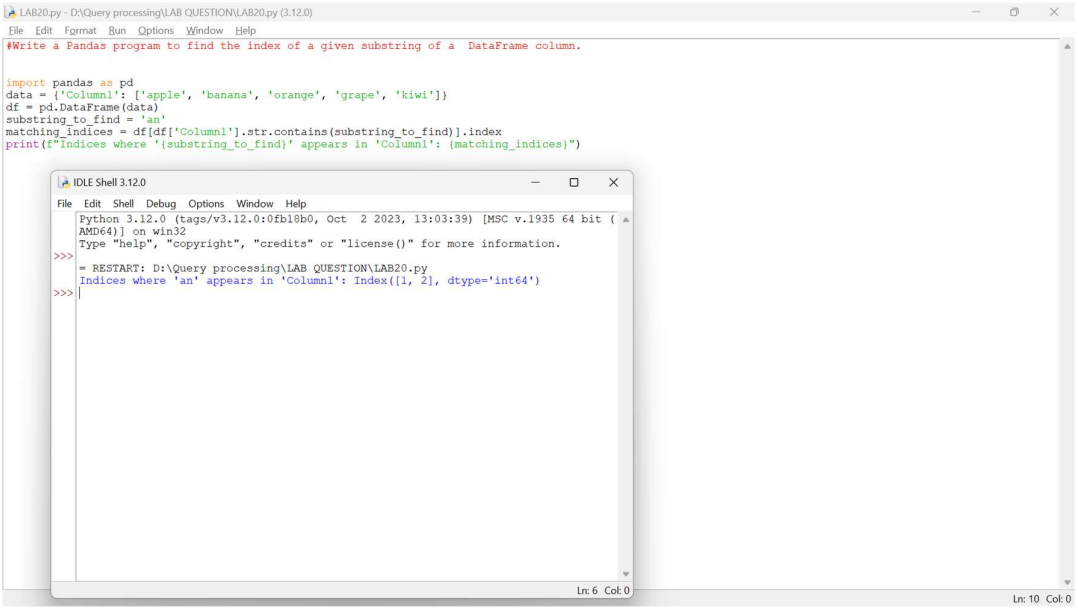
```
import pandas as pd

from io import StringIO

csv_data = """

Year,WHO Region,Country,Type,Display Value

2015,Americas,United States,Beer,200

2015,Europe,France,Wine,300

2016,Africa,Nigeria,Spirits,150

2016,Americas,Canada,Beer,180

2017,Western Pacific,Japan,Spirits,250

"""

df = pd.read_csv(StringIO(csv_data))

# Display dimensions

print("Dimensions of the DataFrame:", df.shape)

# Extract column names

print("Column names:")

for col in df.columns:

    print(col)
```



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

CODE:

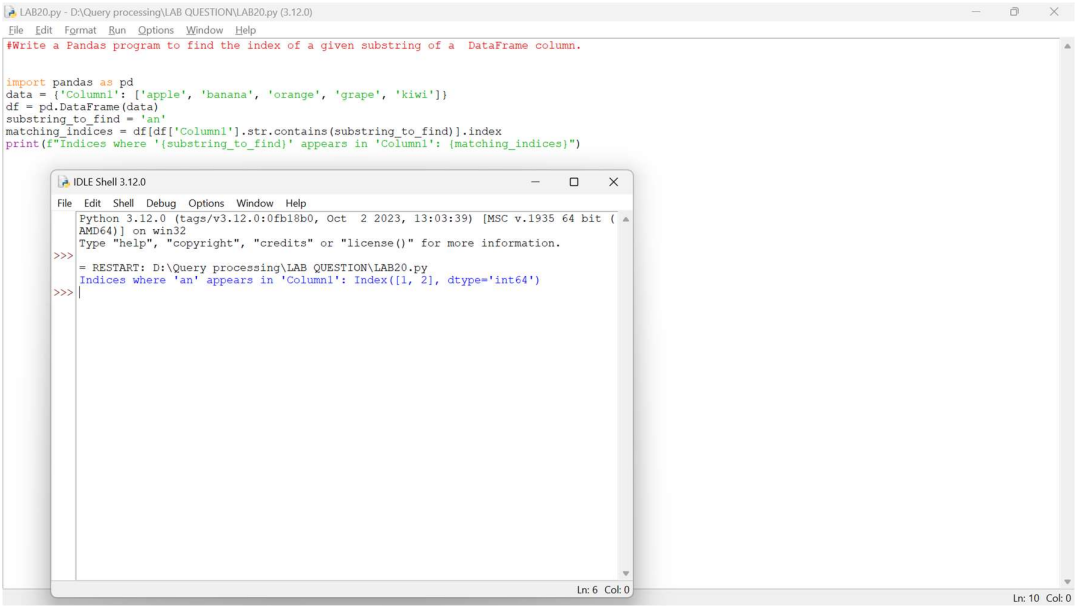
```
import pandas as pd

data = {'Column1': ['apple', 'banana', 'orange', 'grape', 'kiwi']}

df = pd.DataFrame(data)

substring_to_find = 'an'

matching_indices = df[df['Column1'].str.contains(substring_to_find)].index

print(f"Indices where '{substring_to_find}' appears in 'Column1': {matching_indices}")
```



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

CODE:

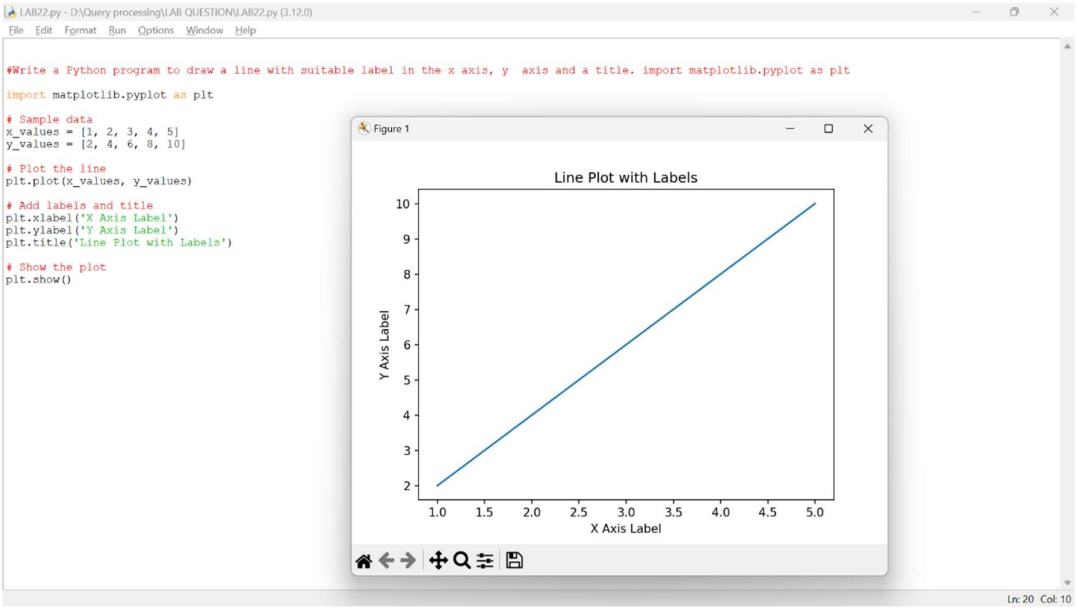
```
import pandas as pd

data = {'Name': ['John', 'Alice', 'Bob', 'Emily'],

        'Age': [25, 30, 35, 40],

        'City': ['New York', 'Los Angeles', 'Chicago', 'San Francisco']}

df = pd.DataFrame(data)

print("Original DataFrame:")

print(df)

# Specify the column to swap cases

column_to_swap = 'Name'

# Swap the case of the specified column

df[column_to_swap] = df[column_to_swap].apply(lambda x: x.swapcase() if isinstance(x, str) else x)

# DataFrame after swapping cases

print("\nDataFrame after swapping cases:")

print(df)
```



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

CODE:

```
import matplotlib.pyplot as plt

x_values = [1, 2, 3, 4, 5]

y_values = [2, 4, 6, 8, 10]

# Plot the line

plt.plot(x_values, y_values)

plt.xlabel('X Axis Label')

plt.ylabel('Y Axis Label')

plt.title('Line Plot with Labels')

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.

CODE:

```
import matplotlib.pyplot as plt

# Read data from the text file

data = []

with open('D:/Query processing/LAB QUESTION/test.txt .txt', 'r') as file:

    for line in file:

        row = line.strip().split()
```

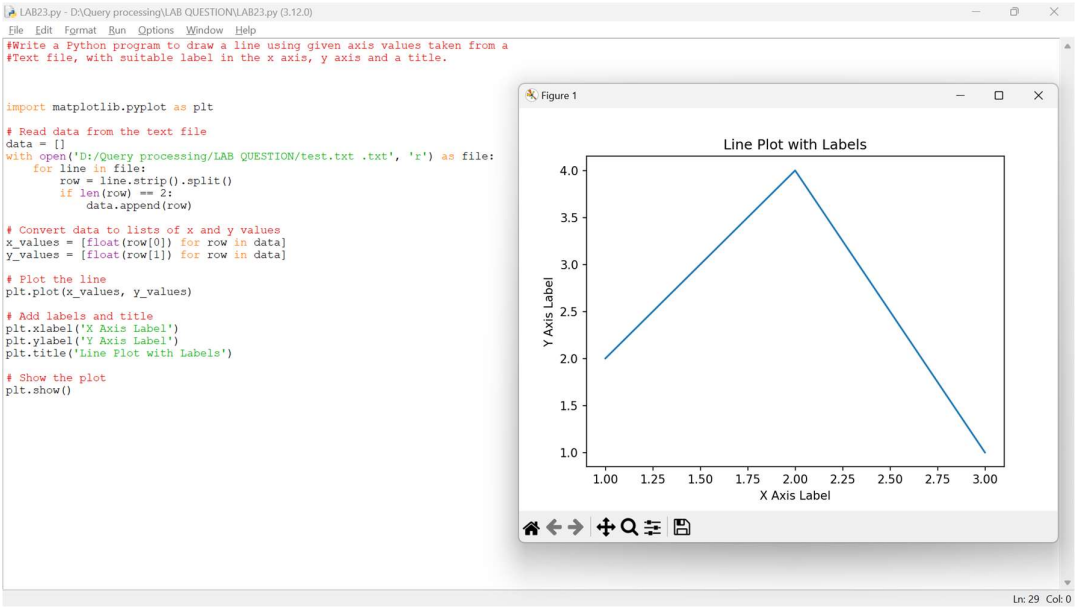
```
    if len(row) == 2:
        data.append(row)
```

 # Convert data to lists of x and y values

```
x_values = [float(row[0]) for row in data]
y_values = [float(row[1]) for row in data]
```

 # Plot the line

```
plt.plot(x_values, y_values)
plt.xlabel('X Axis Label')
plt.ylabel('Y Axis Label')
plt.title('Line Plot with Labels')
plt.show()
```



24, Write a Python program to draw line charts of the financial data of Alphabet Inc. between October 3, 2016 to October 7, 2016.

CODE:

```
import pandas as pd
import matplotlib.pyplot as plt
from io import StringIO
csv_data = """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"""

df = pd.read_csv(StringIO(csv_data), parse_dates=['Date'])

plt.plot(df['Date'], df['Open'], color='blue', label='Open', marker='o')

plt.plot(df['Date'], df['High'], color='green', label='High', marker='o')

plt.plot(df['Date'], df['Low'], color='red', label='Low', marker='o')

plt.plot(df['Date'], df['Close'], color='purple', label='Close', marker='o')

plt.xlabel('Date')

plt.ylabel('Price')

plt.title('Alphabet Inc. Financial Data (Oct 3, 2016 - Oct 7, 2016)')

plt.legend()

plt.show()

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

CODE:

import matplotlib.pyplot as plt

import numpy as np

x_values = np.linspace(0, 10, 100)

y_values_1 = np.sin(x_values)

y_values_2 = np.cos(x_values)

plt.plot(x_values, y_values_1, label='Line 1', color='blue', linewidth=3, linestyle='-', marker='D', markersize=8, markeredgecolor='blue', markerfacecolor='none')

plt.plot(x_values, y_values_2, label='Line 2', color='green', linewidth=5, linestyle='-', marker='D', markersize=8, markeredgecolor='green', markerfacecolor='none')

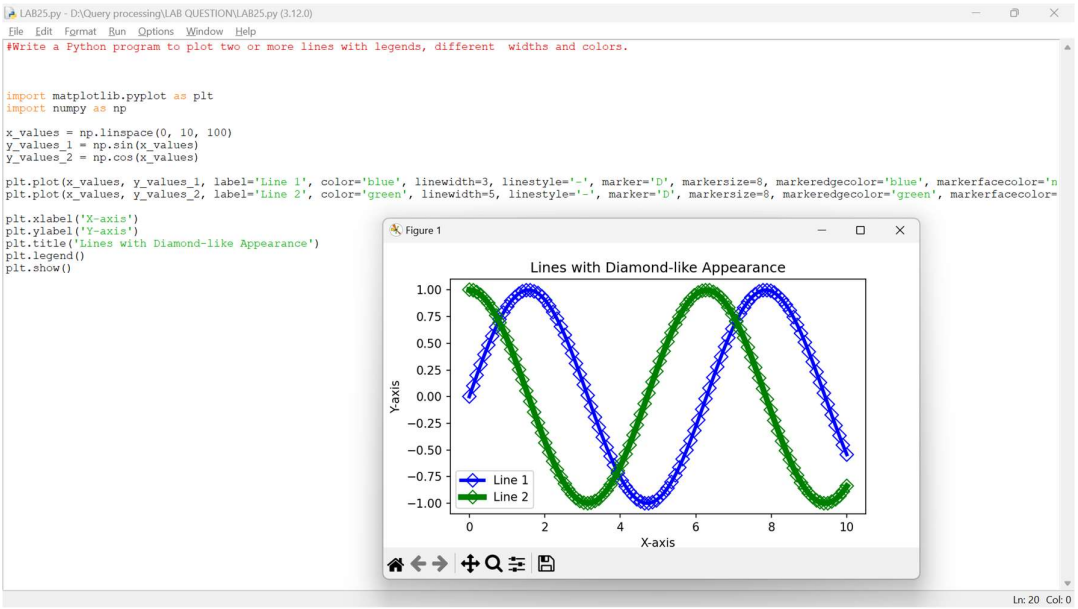
plt.xlabel('X-axis')

plt.ylabel('Y-axis')

plt.title('Lines with Diamond-like Appearance')

plt.legend()

plt.show()



26, Write a Python program to create multiple plots.

CODE:

import matplotlib.pyplot as plt

fig, axes = plt.subplots(nrows=2, ncols=2, figsize=(8, 8))

axes[0, 0].add_patch(plt.Rectangle((0.1, 0.1), 0.8, 0.8, fill=None, edgecolor='blue'))

axes[0, 0].set_title('Square 1')

axes[0, 1].add_patch(plt.Rectangle((0.1, 0.1), 0.8, 0.8, fill=None, edgecolor='green'))

axes[0, 1].set_title('Square 2')

axes[1, 0].add_patch(plt.Rectangle((0.1, 0.1), 0.8, 0.8, fill=None, edgecolor='red'))

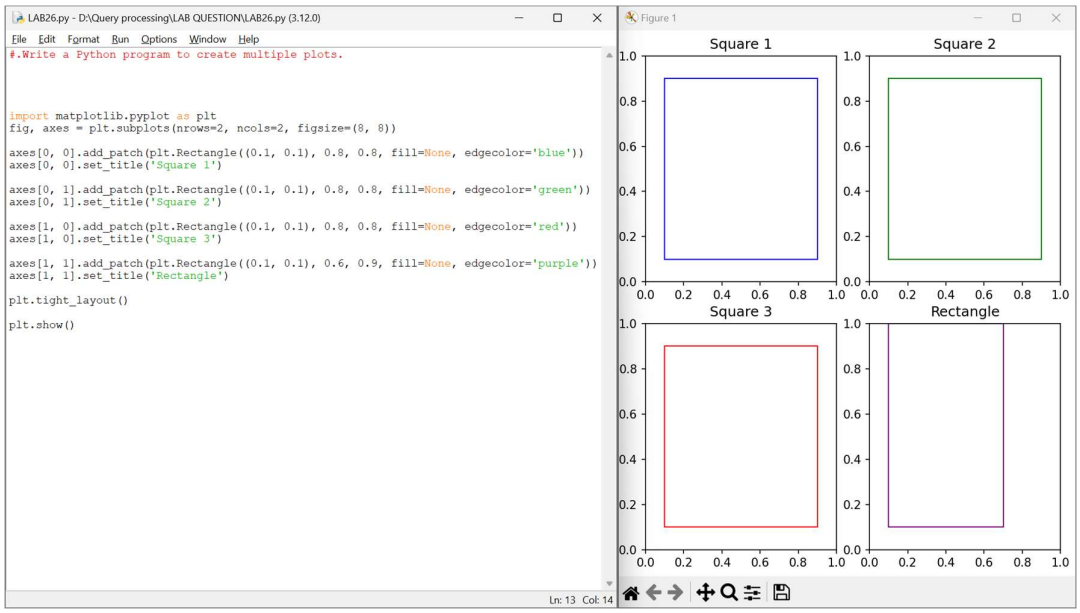
axes[1, 0].set_title('Square 3')

axes[1, 1].add_patch(plt.Rectangle((0.1, 0.1), 0.6, 0.9, fill=None, edgecolor='purple'))

axes[1, 1].set_title('Rectangle')

plt.tight_layout()

plt.show()



27, Write a Python programming to display a bar chart of the popularity of programming Languages.

CODE:

import matplotlib.pyplot as plt

languages = ['Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++']

popularity = [22.2, 17.6, 8.8, 8, 7.7, 6.7]

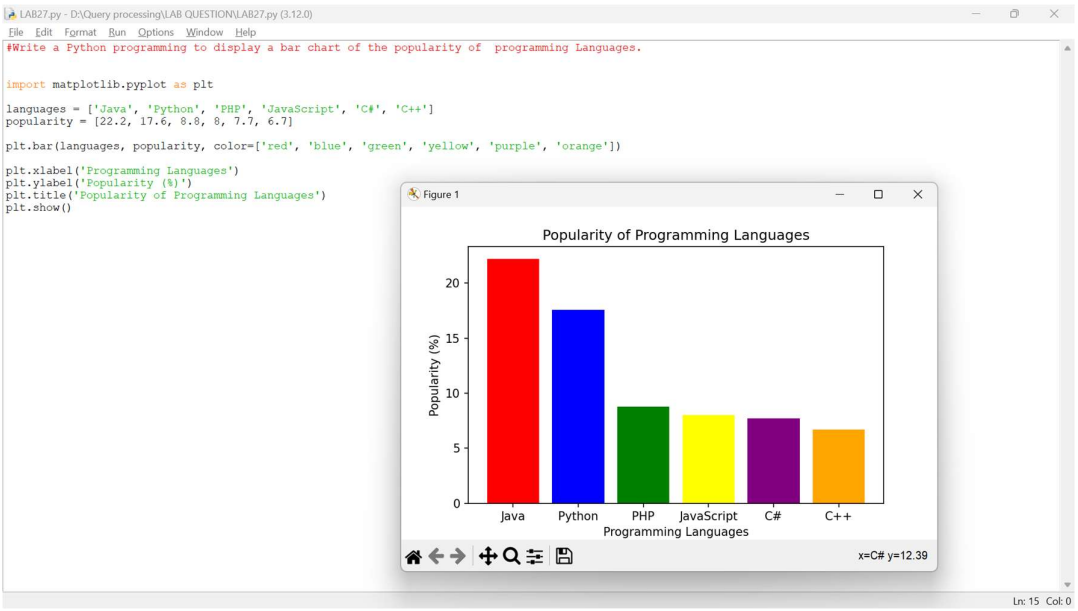
plt.bar(languages, popularity, color=['red', 'blue', 'green', 'yellow', 'purple', 'orange'])

plt.xlabel('Programming Languages')

plt.ylabel('Popularity (%)')

plt.title('Popularity of Programming Languages')

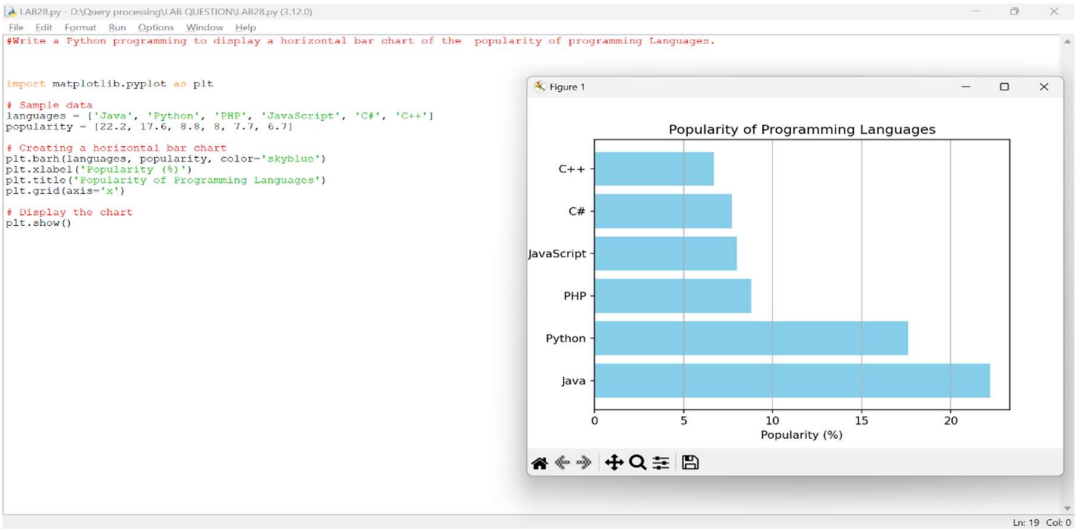
plt.show()



28, Write a Python programming to display a horizontal bar chart of the popularity of programming Languages.

CODE:

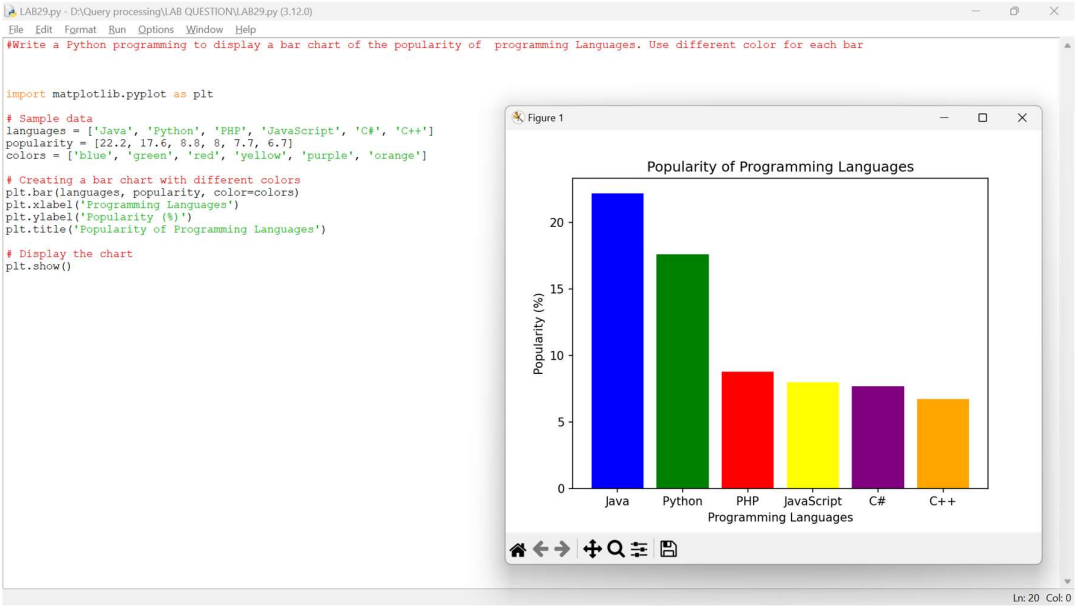
```
import matplotlib.pyplot as plt

languages = ['Java', 'Python', 'PHP', 'JavaScript', 'C#', 'C++']

popularity = [22.2, 17.6, 8.8, 8, 7.7, 6.7]

# Creating a horizontal bar chart

plt.barh(languages, popularity, color='skyblue')

plt.xlabel('Popularity (%)')

plt.title('Popularity of Programming Languages')

plt.grid(axis='x')

plt.show()
```



29, Write a Python programming to display a bar chart of the popularity of programming Languages. Use different color for each bar

CODE:

```
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']

# Creating a bar chart with different colors

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

CODE:

```
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]
```

x_values_men = np.arange(len(groups))

x_values_women = x_values_men + 0.4

plt.bar(x_values_men, means_men, width=0.4, label='Men', color='blue')

plt.bar(x_values_women, means_women, width=0.4, label='Women', color='pink')

plt.xlabel('Groups')

plt.ylabel('Scores')

plt.title('Scores by Group and Gender')

plt.xticks(x_values_men + 0.2, groups)

plt.legend()

plt.show()

OUTPUT:

31, Write a Python program to create a stacked bar plot with error bars.

CODE:

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_dev_men = [4, 3, 4, 1, 5]

std_dev_women = [3, 5, 2, 3, 3]

x_values = np.arange(len(groups))

plt.bar(x_values, means_men, yerr=std_dev_men, label='Men', color='blue', alpha=0.7)

plt.bar(x_values, means_women, yerr=std_dev_women, bottom=means_men, label='Women', color='pink', alpha=0.7)

plt.xlabel('Groups')

plt.ylabel('Scores')

plt.title('Stacked Bar Plot with Error Bars')

plt.xticks(x_values, groups)

plt.legend()

plt.show()

OUTPUT:

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

CODE:

import matplotlib.pyplot as plt

import numpy as np

np.random.seed(42)

num_points = 50

x_values = np.random.rand(num_points)

y_values = np.random.rand(num_points)

plt.scatter(x_values, y_values, color='blue', marker='o', s=50, alpha=0.8)

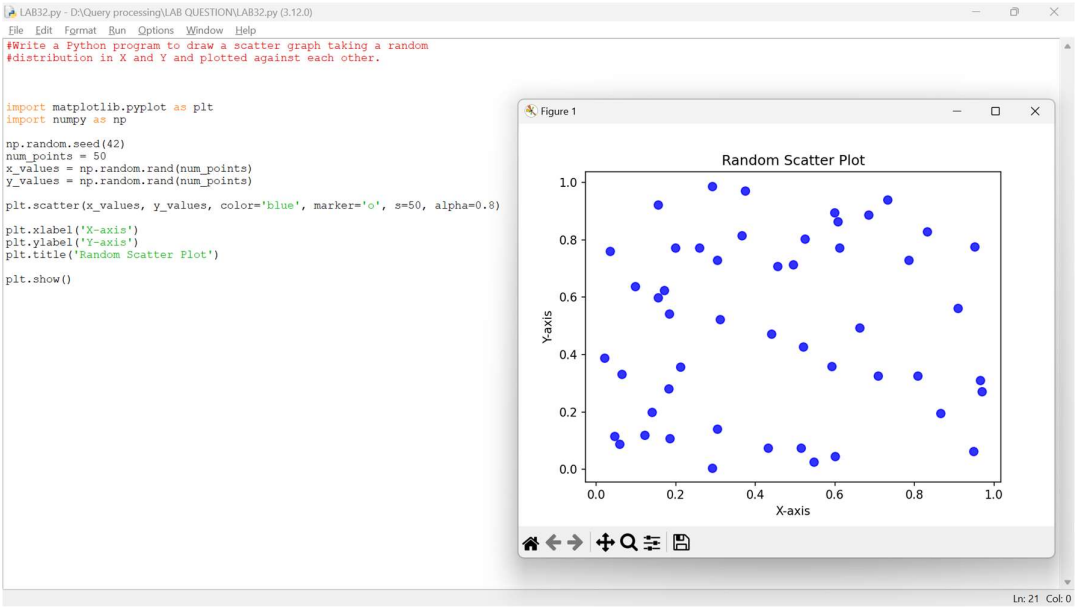
plt.xlabel('X-axis')

plt.ylabel('Y-axis')

plt.title('Random Scatter Plot')

plt.show()

OUTPUT:



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.

CODE:

import matplotlib.pyplot as plt

import numpy as np

np.random.seed(42)

num_points = 50

x_values = np.random.rand(num_points)

y_values = np.random.rand(num_points)

plt.scatter(x_values, y_values, facecolors='none', edgecolors='b', marker='o')

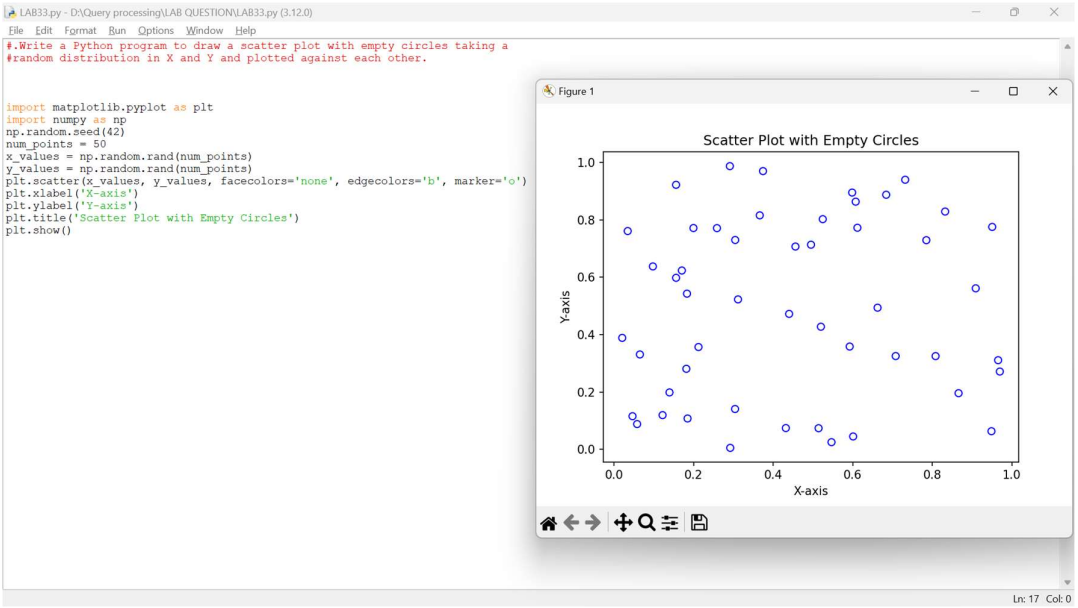
plt.xlabel('X-axis')

plt.ylabel('Y-axis')

plt.title('Scatter Plot with Empty Circles')

plt.show()

OUTPUT:

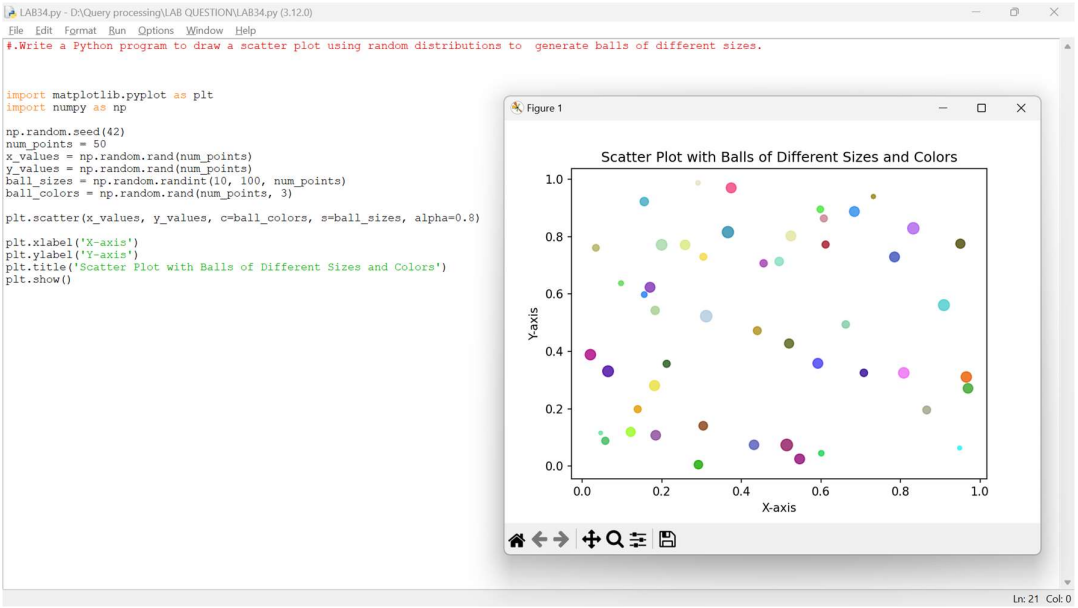


34, .Write a Python program to draw a scatter plot using random distributions to generate balls of different sizes.

CODE:

```
import matplotlib.pyplot as plt

import numpy as np

np.random.seed(42)

num_points = 50

x_values = np.random.rand(num_points)

y_values = np.random.rand(num_points)

ball_sizes = np.random.randint(10, 100, num_points)

ball_colors = np.random.rand(num_points, 3)

plt.scatter(x_values, y_values, c=ball_colors, s=ball_sizes, alpha=0.8)

plt.xlabel('X-axis')

plt.ylabel('Y-axis')

plt.title('Scatter Plot with Balls of Different Sizes and Colors')

plt.show()
```

OUTPUT:

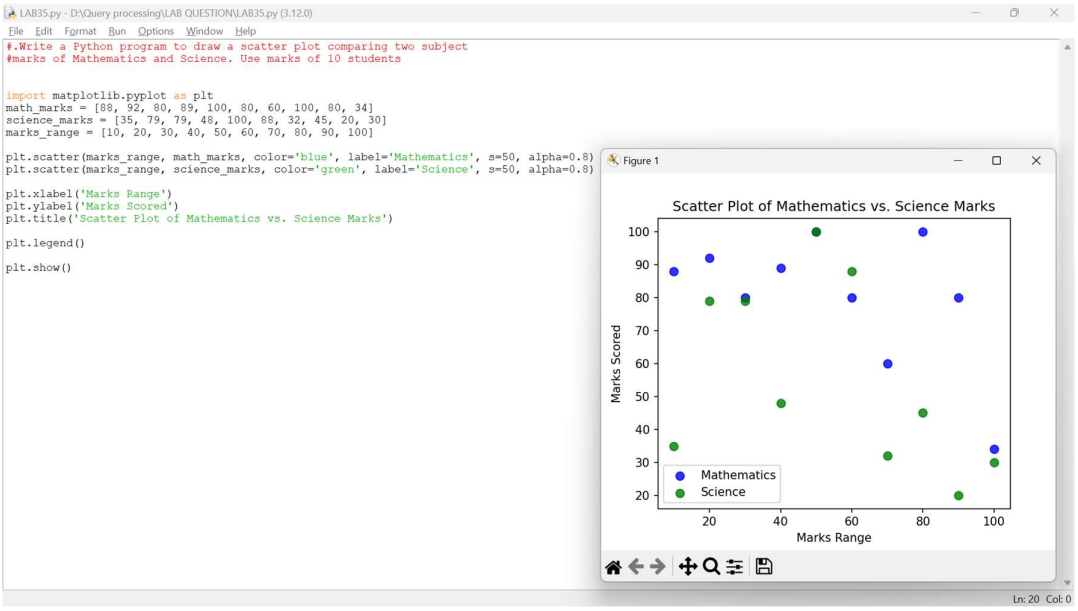


35, Write a Python program to draw a scatter plot comparing two subject marks of Mathematics and Science. Use marks of 10 students

CODE:

```
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(marks_range, math_marks, color='blue', label='Mathematics', s=50, alpha=0.8)

plt.scatter(marks_range, science_marks, color='green', label='Science', s=50, alpha=0.8)

plt.xlabel('Marks Range')

plt.ylabel('Marks Scored')

plt.title('Scatter Plot of Mathematics vs. Science Marks')

plt.legend()

plt.show()
```

OUTPUT:



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

CODE:

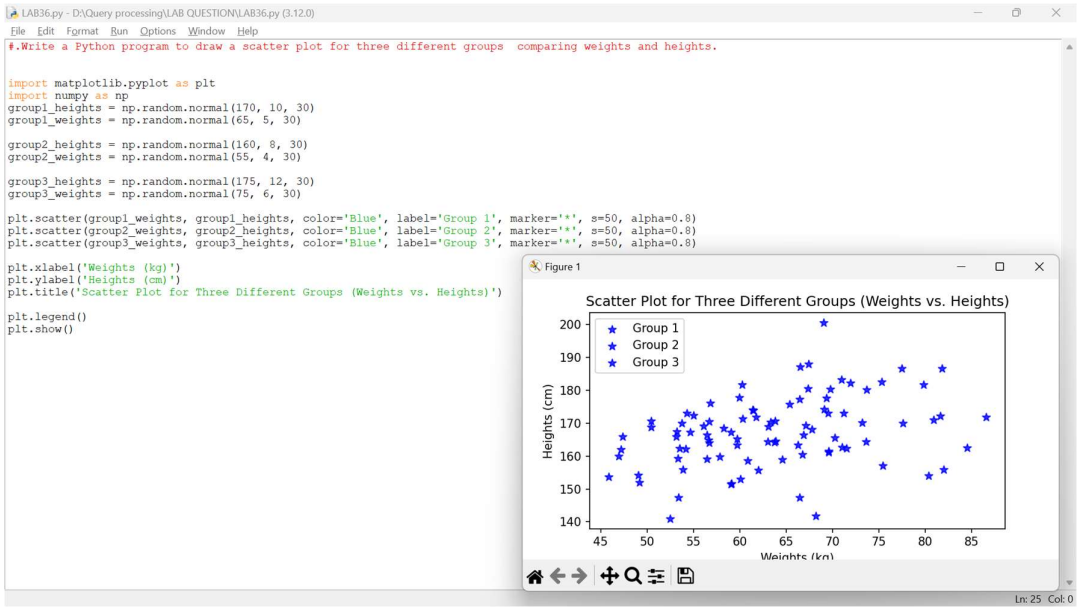
```
import matplotlib.pyplot as plt

import numpy as np

group1_heights = np.random.normal(170, 10, 30)

group1_weights = np.random.normal(65, 5, 30)

group2_heights = np.random.normal(160, 8, 30)

group2_weights = np.random.normal(55, 4, 30)

group3_heights = np.random.normal(175, 12, 30)

group3_weights = np.random.normal(75, 6, 30)


plt.scatter(group1_weights, group1_heights, color='Blue', label='Group 1', marker='*', s=50, alpha=0.8)

plt.scatter(group2_weights, group2_heights, color='Blue', label='Group 2', marker='*', s=50, alpha=0.8)

plt.scatter(group3_weights, group3_heights, color='Blue', label='Group 3', marker='*', s=50, alpha=0.8)


plt.xlabel('Weights (kg)')

plt.ylabel('Heights (cm)')
```

plt.title('Scatter Plot for Three Different Groups (Weights vs. Heights)')

plt.legend()

plt.show()

OUTPUT:



37, Write a Pandas program to create a dataframe from a dictionary and display it.

CODE:

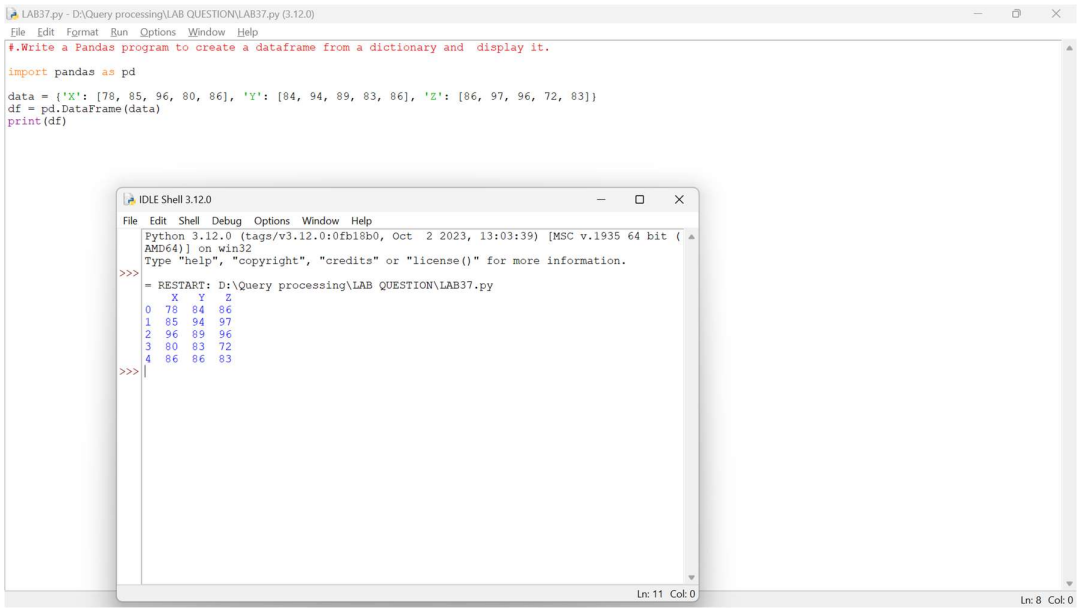
import pandas as pd

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)

OUTPUT:

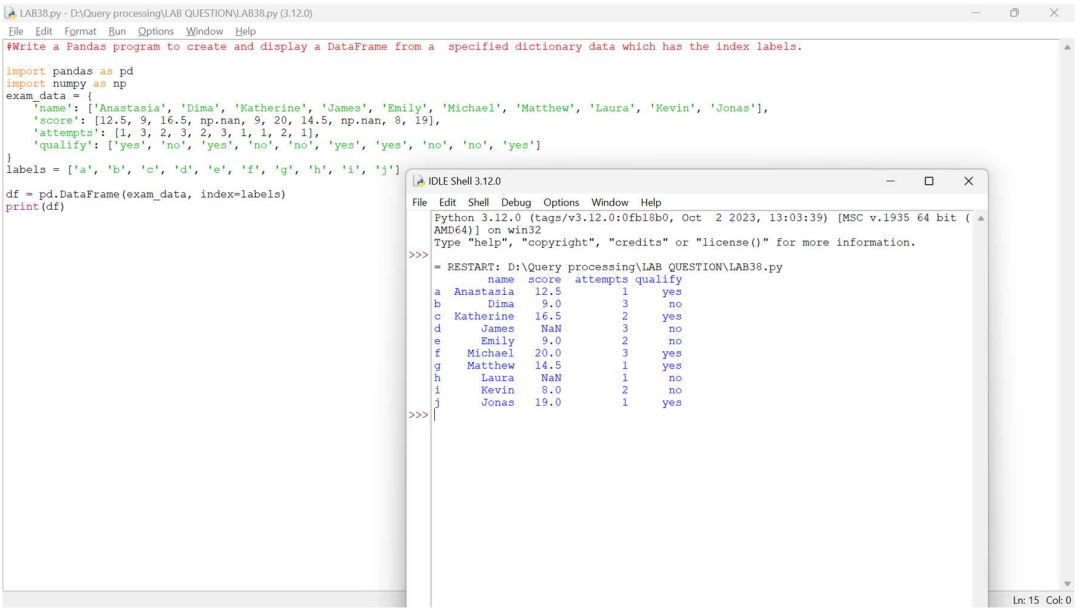


38, Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels.

CODE:

```
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)
```

OUTPUT:

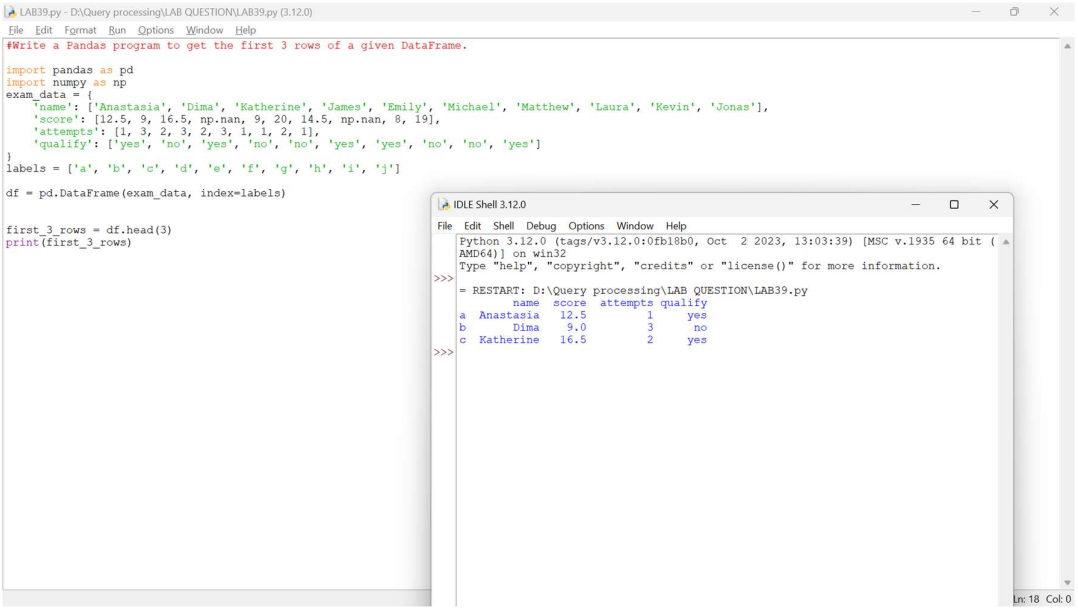


39, Write a Pandas program to get the first 3 rows of a given DataFrame.

CODE:

```
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)
```

OUTPUT:



40, Write a Pandas program to select the 'name' and 'score' columns from

CODE:

```
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)
```

OUTPUT: