DAY 1 – QUERY PROCESSING LAB PRACTICAL

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

INPUT DATASET:

+---------------+----------------------+------------+-------------+

| DEPARTMENT_ID | DEPARTMENT_NAME | MANAGER_ID | LOCATION_ID |

+---------------+----------------------+------------+-------------+

| 10 | Administration | 200 | 1700 |

| 20 | Marketing | 201 | 1800 |

| 30 | Purchasing | 114 | 1700 |

| 40 | Human Resources | 203 | 2400 |

| 50 | Shipping | 121 | 1500 |

| 60 | IT | 103 | 1400 |

| 70 | Public Relations | 204 | 2700 |

| 80 | Sales | 145 | 2500 |

| 90 | Executive | 100 | 1700 |

| 100 | Finance | 108 | 1700 |

| 110 | Accounting | 205 | 1700 |

| 120 | Treasury | 0 | 1700 |

| 130 | Corporate Tax | 0 | 1700 |

| 140 | Control And Credit | 0 | 1700 |

| 150 | Shareholder Services | 0 | 1700 |

| 160 | Benefits | 0 | 1700 |

| 170 | Manufacturing | 0 | 1700 |

| 180 | Construction | 0 | 1700 |

| 190 | Contracting | 0 | 1700 |

| 200 | Operations | 0 | 1700 |

| 210 | IT Support | 0 | 1700 |

| 220 | NOC | 0 | 1700 |

| 230 | IT Helpdesk | 0 | 1700 |

| 240 | Government Sales | 0 | 1700 |

| 250 | Retail | 0 | 1700 |

+---------------+----------------------+------------+-------------

CODE:

```
import pandas as pd
employees = pd.read_csv(r"C:\Users\LENOVO\Desktop\New folder\lab 1 query.csv")
distinct_department_ids = employees['DEPARTMENT_ID'].unique()
print(distinct_department_ids)
```

OUTPUT:

```
[ 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]
```

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

EMPLOYEE_ID	START_DATE	END_DATE	JOB_ID	DEPARTMENT_ID
102	2001-01-13	2006-07-24	IT_PROG	60
101	1997-09-21	2001-10-27	AC_ACCOUNT	110
101	2001-10-28	2005-03-15	AC_MGR	110
201	2004-02-17	2007-12-19	MK_REP	20
114	2006-03-24	2007-12-31	ST_CLERK	50
122	2007-01-01	2007-12-31	ST_CLERK	50
200	1995-09-17	2001-06-17	AD_ASST	90
176	2006-03-24	2006-12-31	SA_REP	80
176	2007-01-01	2007-12-31	SA_MAN	80
200	2002-07-01	2006-12-31	AC_ACCOUNT	90

CODE:

```
import pandas as pd
data={'employee_ID':[102,101,101,201,114,122,200,176,176,200],
 'Start_date':['13-01-2001','21-09-1997','28-10-2001','17-02-2004',
 '24-03-2006','01-01-2007','17-09-1995','24-03-2006','01-01-2007','01-07-2002'],
 'End_date':['24-07-2006','27-10-2001','15-03-2005','19-12-2007','31-12-2007','31-12-2007','17-06-2001','31-12-2006','31-12-2007','31-12-2006'],
```

'Job_ID':['IT_PROG','AC_ACCOUNT','AC_MGR','MK_REP','ST_CLER','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)

data2=df['employee_ID'].value_counts()

print(data2[data2>1])

OUTPUT:

```
employee_ID
101     2
200     2
176     2
Name: count, dtype: int64
```

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

JOB_ID	JOB_TITLE	MIN_SALARY	MAX_SALARY
AD_PRES	President	20080	40000
AD_VP	Administration Vice President	15000	30000
AD_ASST	Administration Assistant	3000	6000
FI_MGR	Finance Manager	8200	16000
FI_ACCOUNT	Accountant	4200	9000
AC_MGR	Accounting Manager	8200	16000
AC_ACCOUNT	Public Accountant	4200	9000
SA_MAN	Sales Manager	10000	20080
SA_REP	Sales Representative	6000	12008
PU_MAN	Purchasing Manager	8000	15000
PU_CLERK	Purchasing Clerk	2500	5500
ST_MAN	Stock Manager	5500	8500
ST_CLERK	Stock Clerk	2008	5000
SH_CLERK	Shipping Clerk	2500	5500
IT_PROG	Programmer	4000	10000
MK_MAN	Marketing Manager	9000	15000
MK_REP	Marketing Representative	4000	9000
HR_REP	Human Resources Representative	4000	9000
PR_REP	Public Relations Representative	4500	10500

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)

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

print(sorted_df)
```

OUTPUT:

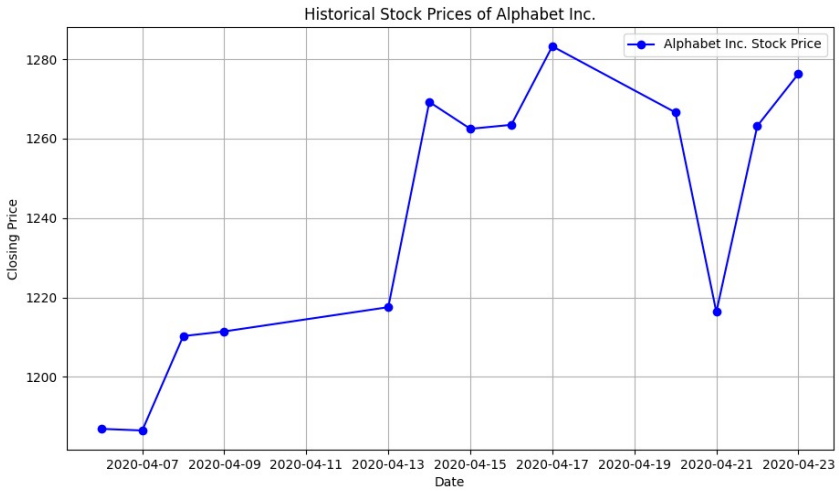
	JOB_ID	JOB_TITLE	MIN_SALARY	MAX_SALARY
11	ST_MAN	Stock Manager	5500	8500
12	ST_CLERK	Stock Clerk	2008	5000
13	SH_CLERK	Shipping Clerk	2500	5500
8	SA_REP	Sales Representative	6000	12008
7	SA_MAN	Sales Manager	10000	20080
9	PU_MAN	Purchasing Manager	8000	15000
10	PU_CLERK	Purchasing Clerk	2500	5500
18	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.

CODE:

```
import pandas as pd

import matplotlib.pyplot as plt

df = pd.read_csv(r'C:\Users\LENOVO\Downloads\WhatsApp Image 2023-11-02 at 09.39.30_85640aa8.jpg.csv')

# Convert the 'date' column to a datetime object

df['date'] = pd.to_datetime(df['date'], format='%d-%m-%Y')

# Define the start and end dates

start_date = '2020-04-06'

end_date = '2020-04-23'

# Filter the data to include only the rows within the specified date range

filtered_data = df[(df['date'] >= start_date) & (df['date'] <= end_date)]

# Create a line plot of the historical stock prices

plt.figure(figsize=(12, 6))

plt.plot(filtered_data['date'], filtered_data['close'], marker='o', linestyle='-', color='b', label='Alphabet Inc. Stock Price')

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

plt.xlabel('Date')

plt.ylabel('Closing Price')

plt.legend()

plt.grid(True)

plt.show()
```

OUTPUT:

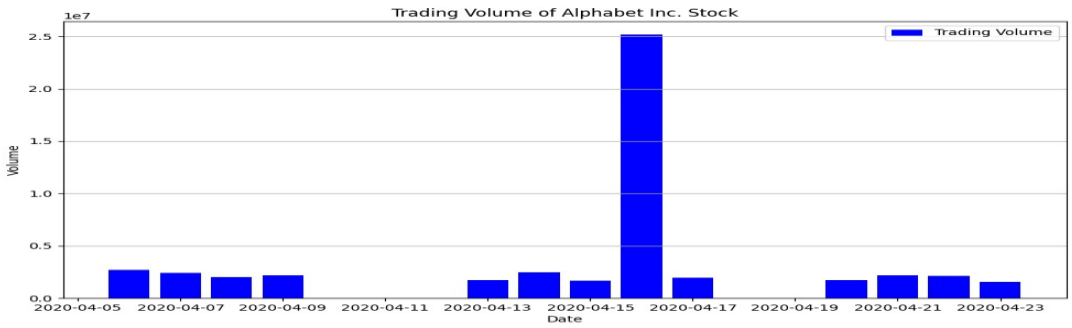


5. Write a Pandas program to create a bar plot of the trading volume of Alphabet Inc. stock between two specific dates.

CODE:

```
import pandas as pd

import matplotlib.pyplot as plt

# Read the historical stock price data from a CSV file

df = pd.read_csv(r"C:\Users\LENOVO\Downloads\WhatsApp Image 2023-11-02 at 09.39.30_85640aa8.jpg.csv")

# Create a DataFrame from the provided data (you can replace this with your data)

# Convert the 'date' column to a datetime object

df['date'] = pd.to_datetime(df['date'], format='%d-%m-%Y')

# Define the start and end dates

start_date = '2020-04-06'

end_date = '2020-04-23'

# Filter the data to include only the rows within the specified date range

filtered_data = df[(df['date'] >= start_date) & (df['date'] <= end_date)]

# Create a bar plot of the trading volume

plt.figure(figsize=(12, 6))

plt.bar(filtered_data['date'], filtered_data['volume'], color='b', label='Trading Volume')

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

plt.xlabel('Date')

plt.ylabel('Volume')

plt.legend()

plt.grid(axis='y')

plt.show()
```

OUTPUT:



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:

Date	Open	High	Low	Close	Adj Close	Volume
01-04-2020	1122	1129.69	1097.45	1105.62	1105.62	2343100
02-04-2020	1098.26	1126.86	1096.4	1120.84	1120.84	1964900
03-04-2020	1119.015	1123.54	1079.81	1097.88	1097.88	2313400
06-04-2020	1138	1194.66	1130.94	1186.92	1186.92	2664700
07-04-2020	1221	1225	1182.23	1186.51	1186.51	2387300
08-04-2020	1206.5	1219.07	1188.16	1210.28	1210.28	1975100
09-04-2020	1224.08	1225.57	1196.735	1211.45	1211.45	2175400
13-04-2020	1209.18	1220.51	1187.598	1217.56	1217.56	1739800
14-04-2020	1245.09	1282.07	1236.93	1269.23	1269.23	2470400
15-04-2020	1245.61	1280.46	1240.4	1262.47	1262.47	1671700
16-04-2020	1274.1	1279	1242.62	1263.47	1263.47	2518100
17-04-2020	1284.85	1294.43	1271.23	1283.25	1283.25	1949000
20-04-2020	1271	1281.6	1261.37	1266.61	1266.61	1695500
21-04-2020	1247	1254.27	1209.71	1216.34	1216.34	2153000
22-04-2020	1245.54	1285.613	1242	1263.21	1263.21	2093100
23-04-2020	1271.55	1293.31	1265.67	1276.31	1276.31	1566200
24-04-2020	1261.17	1280.4	1249.45	1279.31	1279.31	1640400
27-04-2020	1296	1296.15	1269	1275.88	1275.88	1600600
28-04-2020	1287.93	1288.05	1232.2	1233.67	1233.67	2951300
29-04-2020	1341.46	1359.99	1325.34	1341.48	1341.48	3793600
30-04-2020	1324.88	1352.82	1322.49	1348.66	1348.66	2665400
01-05-2020	1328.5	1352.07	1311	1320.61	1320.61	2072500

CODE:

```
import pandas as pd

import matplotlib.pyplot as plt

df = pd.read_csv(r"C:\Users\LENOVO\Downloads\WhatsApp Image 2023-11-02 at 09.39.30_85640aa8.jpg.csv")

df['date'] = pd.to_datetime(df['date'], format='%d-%m-%Y')

# Define the start and end dates

start_date = '2020-04-06'

end_date = '2020-04-23'

# Filter the data to include only the rows within the specified date range

filtered_data = df[(df['date'] >= start_date) & (df['date'] <= end_date)]

# Create a scatter plot of trading volume vs. stock prices

plt.figure(figsize=(12, 6))

plt.scatter(filtered_data['volume'], filtered_data['close'], color='b', label='Volume vs. Stock Prices')

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

plt.xlabel('Volume')

plt.ylabel('Closing Price')

plt.legend()

plt.grid(True)

plt.show()
```

OUTPUT:

Item	MaxSaleValue	MinSaleValue
Cell Phone	14400.0	6075.0
Desk	250.0	250.0
Home Theater	40500.0	14000.0
Television	113810.0	38336.0
Video Games	936.0	936.0

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)

CODE:

```
import pandas as pd

# Create a sample sales data DataFrame (replace this with your actual data)

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)

# Create a pivot table to find the maximum and minimum sale values for each item

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

# Rename columns for clarity

pivot_table.columns = ['MaxSaleValue', 'MinSaleValue']

# Print the pivot table

print(pivot_table)
```

OUTPUT:

Item	Units
Cell Phone	91
Desk	2
Home Theater	308
Television	509
Video Games	16

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

CODE:

```
import pandas as pd

# Create a sample sales data DataFrame (replace this with your actual data)

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)

# Create a pivot table to find the unit sold for each item

pivot_table = sales_data.pivot_table(index='Item', values='Units', aggfunc='sum')

# Print the pivot table

print(pivot_table)
```

OUTPUT:

Item	Units
Cell Phone	91
Desk	2
Home Theater	308
Television	509
Video Games	16

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)

Sales_data:

OrderDate	Region	Manager	SalesMan	Item	Units	Unit_price	Sale_amt
1-6-18	East	Martha	Alexander	Television	95	1,198.00	1,13,810.00
1-23-18	Central	Hermann	Shelli	Home Theater	50	500.00	25,000.00
2-9-18	Central	Hermann	Luis	Television	36	1,198.00	43,128.00
2-26-18	Central	Timothy	David	Cell Phone	27	225.00	6,075.00
3-15-18	West	Timothy	Stephen	Television	56	1,198.00	67,088.00
4-1-18	East	Martha	Alexander	Home Theater	60	500.00	30,000.00
4-18-18	Central	Martha	Steven	Television	75	1,198.00	89,850.00
5-5-18	Central	Hermann	Luis	Television	90	1,198.00	1,07,820.00
5-22-18	West	Douglas	Michael	Television	32	1,198.00	38,336.00
6-8-18	East	Martha	Alexander	Home Theater	60	500.00	30,000.00
6-25-18	Central	Hermann	Sigal	Television	90	1,198.00	1,07,820.00
7-12-18	East	Martha	Diana	Home Theater	29	500.00	14,500.00
7-29-18	East	Douglas	Karen	Home Theater	81	500.00	40,500.00
8-15-18	East	Martha	Alexander	Television	35	1,198.00	41,930.00
9-1-18	Central	Douglas	John	Desk	2	125.00	250.00
9-18-18	East	Martha	Alexander	Video Games	16	58.50	936.00
10-5-18	Central	Hermann	Sigal	Home Theater	28	500.00	14,000.00
10-22-18	East	Martha	Alexander	Cell Phone	64	225.00	14,400.00

CODE:

```
import pandas as pd

# Create a sample sales data DataFrame (replace this with your actual data)

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)

# Create a pivot table to find the unit sold for each item

pivot_table = sales_data.pivot_table(index='Item', values='Units', aggfunc='sum')

# Print the pivot table

print(pivot_table)
```

OUTPUT:

Region	Manager	SalesMan	Sale_amt
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.

CODE:

```
import pandas as pd

import numpy as np

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

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

def highlight_numbers(val):

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

 return f'color: {color}'
```

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

styled_df
```

OUTPUT:

	A	B	C	D	E
0	1	1.32921	-0.770033	-0.31628	-0.99081
1	2	-1.07082	-1.43871	0.564417	0.295722
2	3	-1.6264	0.219565	0.678805	1.88927
3	4	0.961538	0.104011	-0.481165	0.850229
4	5	1.45342	1.05774	0.165562	0.515018
5	6	-1.33694	0.562861	1.39285	-0.063328
6	7	0.121668	1.2076	-0.00204021	1.6278
7	8	0.354493	1.03753	-0.385684	0.519818
8	9	1.68658	-1.32596	1.42898	-2.08935
9	10	-0.12982	0.631523	-0.586538	0.29072