ASSIGNMENT -2
Python Programming

Question-1 :

1 . Importing Required Package

Solution :

```
import pandas as pd import
seaborn as sns import numpy as np from
matplotlib import pyplot as plt
%matplotlib inline
```

Question-2 :

1. Loading the Dataset

Solution :

```
df = pd.read_csv("/content/Churn_Modelling.csv")  df
```

Output:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
0	1	15634602	Hargrave	619	France	Female	42	2	0.00	1	1	1	101348.88	1
1	2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	0	1	112542.58	0
2	3	15619304	Onio	502	France	Female	42	8	159660.80	3	1	0	113931.57	1
3	4	15701354	Boni	699	France	Female	39	1	0.00	2	0	0	93826.63	0
4	5	15737888	Mitchell	850	Spain	Female	43	2	125510.82	1	1	1	79084.10	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9995	9996	15606229	Obijiaku	771	France	Male	39	5	0.00	2	1	0	96270.64	0
9996	9997	15569892	Johnstone	516	France	Male	35	10	57369.61	1	1	1	101699.77	0
9997	9998	15584532	Liu	709	France	Female	36	7	0.00	1	0	1	42085.58	1
9998	9999	15682355	Sabbatini	772	Germany	Male	42	3	75075.31	2	1	0	92888.52	1
9999	10000	15628319	Walker	792	France	Female	28	4	130142.79	1	1	0	38190.78	0

10000 rows × 14 columns

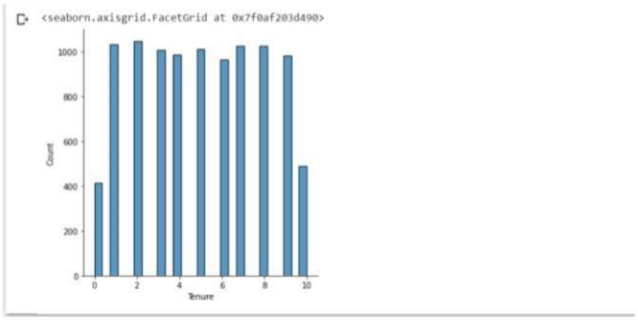
3. Visualizations

Question-3 :

3.1 Univariate Analysis Solution:

```
sns.displot(df.Tenure)
```

Output:

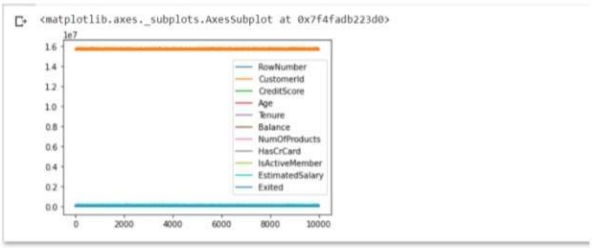


3.2 Bi-Variate Analysis

Solution:

```
df.plot.line()
```

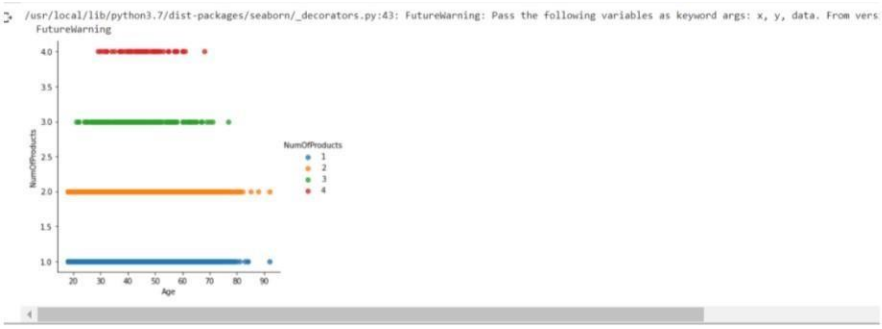
Output:



3.3 Multi - Variate Analysis Solution:

```
sns.lmplot("Age","NumOfProducts",df,hue="NumOfProducts", fit_reg=False);
```

Output:



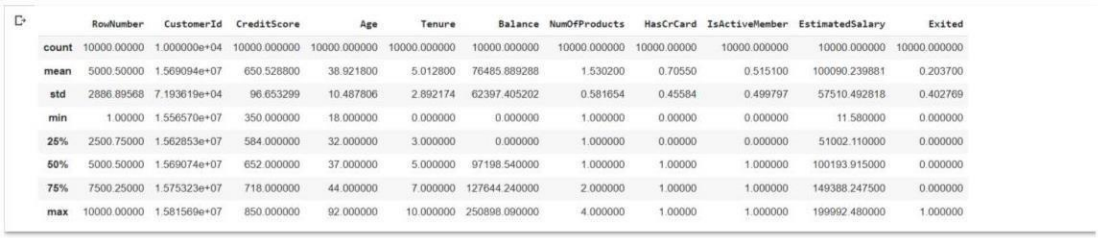
4. Perform descriptive statistics on the dataset.

Question-4 :

Solution:

df.describe()

Output:



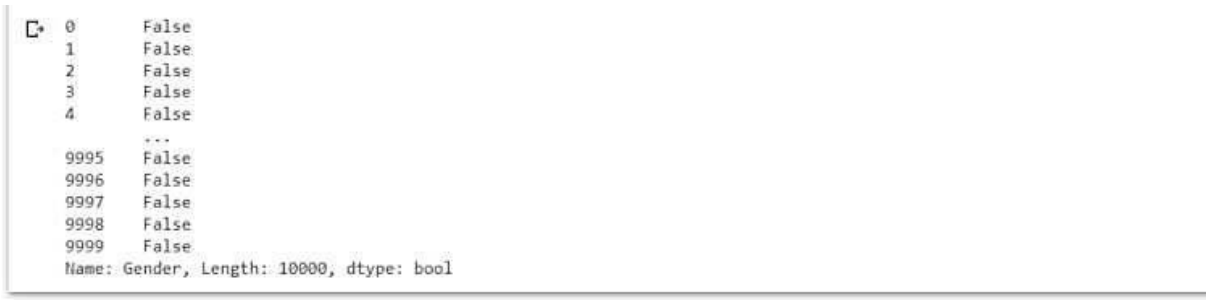
	RowNumber	CustomerId	CreditScore	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
count	10000.00000	1.000000e+04	10000.000000	10000.000000	10000.000000	10000.000000	10000.000000	10000.00000	10000.000000	10000.000000	10000.000000
mean	5000.50000	1.569094e+07	650.528800	38.921800	5.012800	76485.889288	1.530200	0.70550	0.515100	100090.239881	0.203700
std	2886.89568	7.193619e+04	96.653299	10.487806	2.892174	62397.405202	0.581654	0.45584	0.499797	57510.492818	0.402769
min	1.00000	1.556570e+07	350.000000	18.000000	0.000000	0.000000	1.000000	0.00000	0.000000	11.580000	0.000000
25%	2500.75000	1.562853e+07	584.000000	32.000000	3.000000	0.000000	1.000000	0.00000	0.000000	51002.110000	0.000000
50%	5000.50000	1.569074e+07	652.000000	37.000000	5.000000	97198.540000	1.000000	1.00000	1.000000	100193.915000	0.000000
75%	7500.25000	1.575323e+07	718.000000	44.000000	7.000000	127644.240000	2.000000	1.00000	1.000000	149388.247500	0.000000
max	10000.00000	1.581569e+07	850.000000	92.000000	10.000000	250898.090000	4.000000	1.00000	1.000000	199992.480000	1.000000

5. Handle the Missing values. Question-5 :

Solution:

data = pd.read_csv("Churn_Modelling.csv") pd.isnull(data["Gender"])

Output:



Question-6: 1. **Find the outliers and replace the outliers.** **Solution:**

```
df["Tenure"] = np.where(df["Tenure"] >10, np.median,df["Tenure"]) df["Tenure"]
```

Output:

Question-7 :

1. **Check for Categorical columns and perform encoding.** **Solution:**

```
pd.get_dummies(df, columns=["Gender", "Age"], prefix=["Age", "Gender"] ).head()
```

Output:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	...	Gender_78
0	1	15634602	Hargrave	619	France	2	0.00	1	1	1	...	0
1	2	15647311	Hill	608	Spain	1	83807.86	1	0	1	...	0
2	3	15619304	Onio	502	France	8	159660.80	3	1	0	...	0
3	4	15701354	Boni	699	France	1	0.00	2	0	0	...	0
4	5	15737888	Mitchell	850	Spain	2	125510.82	1	1	1	...	0

5 rows × 84 columns

Output:

HasCrCard	IsActiveMember	...	Gender_78	Gender_79	Gender_80	Gender_81	Gender_82	Gender_83	Gender_84	Gender_85	Gender_88	Gender_92
1	1	...	0	0	0	0	0	0	0	0	0	0
0	1	...	0	0	0	0	0	0	0	0	0	0
1	0	...	0	0	0	0	0	0	0	0	0	0
0	0	...	0	0	0	0	0	0	0	0	0	0
1	1	...	0	0	0	0	0	0	0	0	0	0

Question-8:

1. **Split the data into dependent and independent variables 8.1 Split the data into Independent variables.** **Solution:**

Output:

```
[[1 15634602 'Hargrave' ... 1 1 1]
 [2 15647311 'Hill' ... 1 0 1]
 [3 15619304 'Onio' ... 3 1 0]
 ...
 [9998 15584532 'Liu' ... 1 0 1]
 [9999 15682355 'Sabbatini' ... 2 1 0]
 [10000 15628319 'Walker' ... 1 1 0]]
```

8.2 Split the data into Dependent variables. **Solution:**

A.

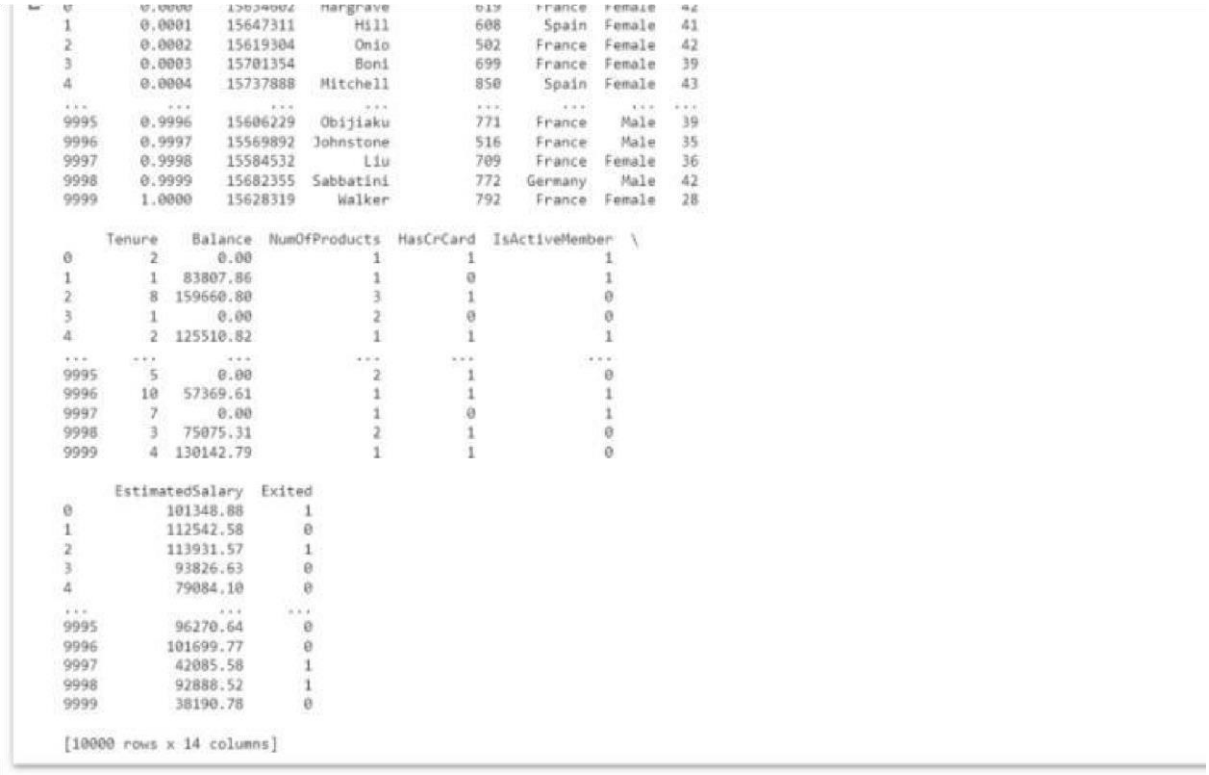
Output:

Question-9 :

1. **Scale the independent variables** **Solution:**

```
import pandas as pd  from sklearn.preprocessing import MinMaxScaler
scaler = MinMaxScaler()  df[["RowNumber"]] =
scaler.fit_transform(df[["RowNumber"]]) print(df)
```

Output:



```
      0.0000    15634602    Hargrave          619    France  Female   42
1     0.0001    15647311        Hill          608     Spain  Female   41
2     0.0002    15619304        Onio          502    France  Female   42
3     0.0003    15701354        Boni          699    France  Female   39
4     0.0004    15737888    Mitchell          850     Spain  Female   43
...      ...         ...         ...          ...       ...     ...  ...
9995  0.9996    15606229    Obijiaku          771    France    Male   39
9996  0.9997    15569892    Johnstone         516    France    Male   35
9997  0.9998    15584532          Liu         709    France  Female   36
9998  0.9999    15682355    Sabbatini         772   Germany    Male   42
9999  1.0000    15628319      Walker          792    France  Female   28

      Tenure    Balance  NumOfProducts  HasCrCard  IsActiveMember  \
0          2       0.00              1          1               1
1          1   83807.86              1          0               1
2          8  159660.80              3          1               0
3          1       0.00              2          0               0
4          2  125510.82              1          1               1
...      ...        ...            ...        ...             ...
9995       5       0.00              2          1               0
9996      10   57369.61              1          1               1
9997       7       0.00              1          0               1
9998       3   75075.31              2          1               0
9999       4  130142.79              1          1               0

      EstimatedSalary  Exited
0           101348.88       1
1           112542.58       0
2           113931.57       1
3            93826.63       0
4            79084.10       0
...               ...     ...
9995         96270.64       0
9996        101699.77       0
9997         42085.58       1
9998         92888.52       1
9999         38190.78       0

[10000 rows x 14 columns]
```

Question-10 :

1. **Split the data into training and testing Solution:**

```
from sklearn.model_selection import train_test_split train_size=0.8
    A. = df.drop(columns =
        ['Tenure']).copy() y = df['Tenure']
X_train, X_rem, y_train, y_rem = train_test_split(X,y, train_size=0.8) test_size = 0.5 X_valid,
X_test, y_valid, y_test = train_test_split(X_rem,y_rem, test_size=0.5)  print(X_train.shape),
        print(y_train.shape) print(X_valid.shape),
 print(y_valid.shape)
print(X_test.shape), print(y_test.shape)
```

Output:

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TEAM MEMBERS:

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2. VIGNESH V
3. SIVA S

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TEAM SIZE: 4

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