ASSIGNMENT 2

IMPORT THE NECESSARY LIBRARIES

In [ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

IMPORT THE DATA SET INTO DATAFRAME

In [2]:
```
df=pd.read_csv('Churn_Modelling.csv')
```

In [3]:
```
df.head()
```

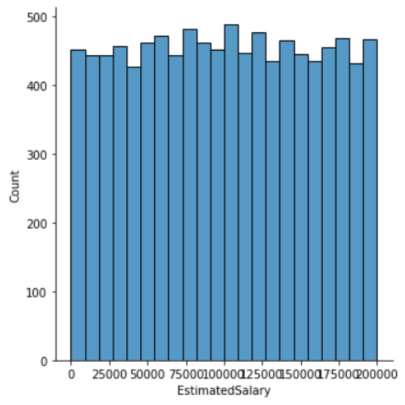
Out[3]:

	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

VISUALIZATION

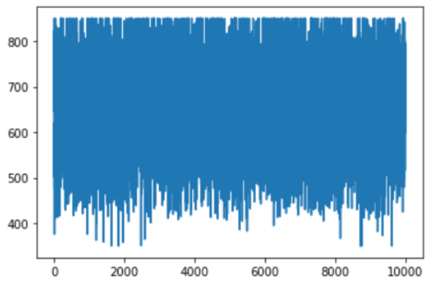
In [5]:
```
sns.displot(df['EstimatedSalary'])
```

Out[5]:



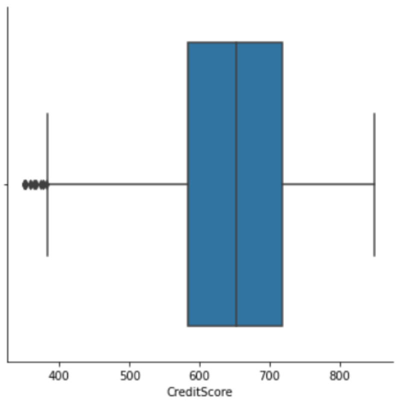
In [15]:
```
#univariate analysis
df.CreditScore.plot()
```

Out[15]:



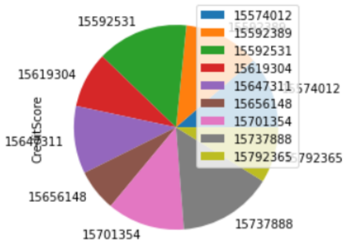
In [6]:
```
sns.catplot(x='CreditScore',kind='box',data=df)
```

Out[6]:



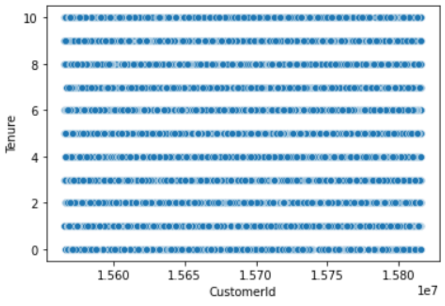
In [16]:
```
df[1:10].groupby(['CustomerId']).sum().plot(kind='pie', y='CreditScore')
```

Out[16]:



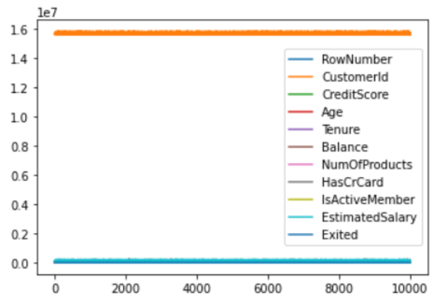
In [17]:
```
sns.scatterplot(df.CustomerId,df.Tenure)
plt.show()
```

```
C:\Users\darat\AppData\Local\Programs\Python\Python36\lib\site-packages\seaborn\_decorators.py:43: FutureWarning: Pass the following variables as keywo
rd args: x, y. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will resul
t in an error or misinterpretation.
  FutureWarning
```



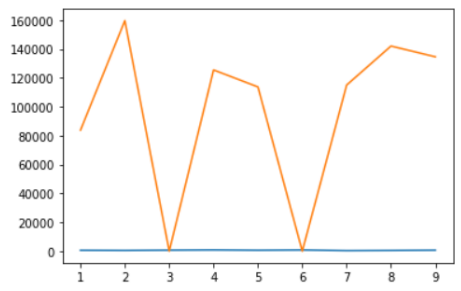
In [19]:
```
#multivariate analysis
df.plot()
```

Out[19]:



In [25]:
```
#bivariate analysis
df.CreditScore[1:10].plot()
df.Balance[1:10].plot()
```

Out[25]:



DESCRIPTIVE ANALYSIS

In [31]:
```
df.describe()
```

Out[31]:

	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

CHECKING FOR MISSING VALUES

In [32]:
```
df.isnull().any()
```

Out[32]:
```
RowNumber          False
CustomerId         False
Surname            False
CreditScore        False
Geography          False
Gender             False
Age                False
Tenure             False
Balance            False
NumOfProducts      False
HasCrCard          False
IsActiveMember     False
EstimatedSalary    False
Exited             False
dtype: bool
```

In [33]:
```
df.isnull().sum()
```

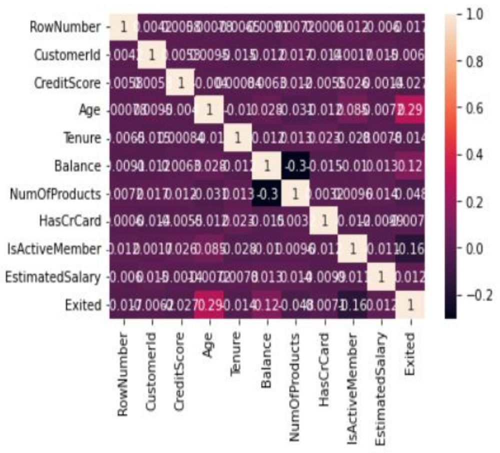
Out[33]:
```
RowNumber          0
CustomerId         0
Surname            0
CreditScore        0
Geography          0
Gender             0
Age                0
Tenure             0
Balance            0
NumOfProducts      0
HasCrCard          0
IsActiveMember     0
EstimatedSalary    0
Exited             0
dtype: int64
```

HANDLING VALUES

In [36]:
```
#No null values to handle
```

In [37]:
```
sns.heatmap(df.corr(),annot=True)
```

Out[37]:

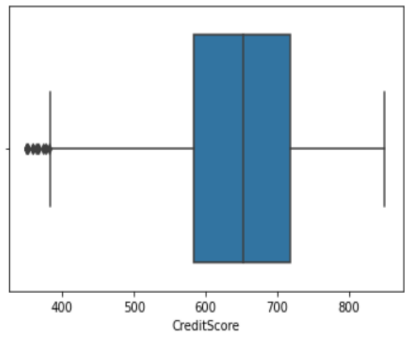


OUTLIERS

In [38]:
```
#occurence of outliers
sns.boxplot(df.CreditScore)
```

```
C:\Users\darat\AppData\Local\Programs\Python\Python36\lib\site-packages\seaborn\_decorators.py:43: FutureWarning: Pass the following variable as a keyw
ord arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result i
n an error or misinterpretation.
  FutureWarning
```

Out[38]:



In [39]:
```
Q1= df.CreditScore.quantile(0.25)
Q3=df.CreditScore.quantile(0.75)
```

In [40]:
```
IQR=Q3-Q1
```

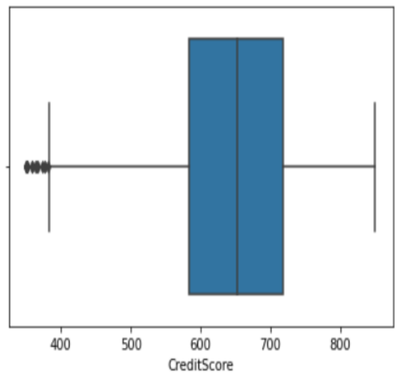
In [41]:
```
upper_limit =Q3 + 1.5*IQR
lower_limit =Q1 - 1.5*IQR
```

In [44]:
```
df['CreditScore'] = np.where(df['CreditScore']>upper_limit,30,df['CreditScore'])
```

In [45]:
```
sns.boxplot(df.CreditScore)
```

```
C:\Users\darat\AppData\Local\Programs\Python\Python36\lib\site-packages\seaborn\_decorators.py:43: FutureWarning: Pass the following variable as a keyw
ord arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result i
n an error or misinterpretation.
  FutureWarning
```

Out[45]:



CATEGORICAL COLUMNS _ENCODING

In [46]:
```
#label encoder
from sklearn.preprocessing import LabelEncoder
```

In [47]:
```
le=LabelEncoder()
```

In [52]:
```
df.Gender= le.fit_transform(df.Gender)
```

In [54]:
```
df.head(5)
```

Out[54]:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
0	1	15634602	Hargrave	619	France	0	42	2	0.00	1	1	1	101348.88	1
1	2	15647311	Hill	608	Spain	0	41	1	83807.86	1	0	1	112542.58	0
2	3	15619304	Onio	502	France	0	42	8	159660.80	3	1	0	113931.57	1
3	4	15701354	Boni	699	France	0	39	1	0.00	2	0	0	93826.63	0
4	5	15737888	Mitchell	850	Spain	0	43	2	125510.82	1	1	1	79084.10	0

In [55]:

```
#one hot encoding
df_main=pd.get_dummies(df,columns=['Geography'])
df_main.head()
```

Out[55]:

	RowNumber	CustomerId	Surname	CreditScore	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited	Geography_France
0	1	15634602	Hargrave	619	0	42	2	0.00	1	1	1	101348.88	1	1
1	2	15647311	Hill	608	0	41	1	83807.86	1	0	1	112542.58	0	0
2	3	15619304	Onio	502	0	42	8	159660.80	3	1	0	113931.57	1	1
3	4	15701354	Boni	699	0	39	1	0.00	2	0	0	93826.63	0	1
4	5	15737888	Mitchell	850	0	43	2	125510.82	1	1	1	79084.10	0	0

SEPARATING INDEPENDENT AND DEPENDENT VARIABLES

In [70]:

```
X=df_main.drop(columns=['EstimatedSalary'],axis=1)
X.head()
X_scaled=pd.DataFrame(scale(X),columns=X.columns)
X_scaled.head()
```

Out[70]:

	RowNumber	CustomerId	CreditScore	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	Exited	Geography_France
0	-1.731878	-0.783213	-0.326221	-1.095988	0.293517	-1.041760	-1.225848	-0.911583	0.646092	0.970243	1.977165	0.997204
1	-1.731531	-0.606534	-0.440036	-1.095988	0.198164	-1.387538	0.117350	-0.911583	-1.547768	0.970243	-0.505775	-1.002804
2	-1.731185	-0.995885	-1.536794	-1.095988	0.293517	1.032908	1.333053	2.527057	0.646092	-1.030670	1.977165	0.997204
3	-1.730838	0.144767	0.501521	-1.095988	0.007457	-1.387538	-1.225848	0.807737	-1.547768	-1.030670	-0.505775	0.997204
4	-1.730492	0.652659	2.063884	-1.095988	0.388871	-1.041760	0.785728	-0.911583	0.646092	0.970243	-0.505775	-1.002804

In [71]:
```
y=df_main.EstimatedSalary
y
```

Out[71]:
```
0       101348.88
1       112542.58
2       113931.57
3        93826.63
4        79084.10
          ...
9995     96270.64
9996    101699.77
9997     42085.58
9998     92888.52
9999     38190.78
Name: EstimatedSalary, Length: 10000, dtype: float64
```

SCALING

In [72]:
```
from sklearn.preprocessing import scale
```

In [73]:
```
X_scaled=pd.DataFrame(scale(X),columns=X.columns)
X_scaled.head()
```

Out[73]:

	RowNumber	CustomerId	CreditScore	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	Exited	Geography_France
0	-1.731878	-0.783213	-0.326221	-1.095988	0.293517	-1.041760	-1.225848	-0.911583	0.646092	0.970243	1.977165	0.997204
1	-1.731531	-0.606534	-0.440036	-1.095988	0.198164	-1.387538	0.117350	-0.911583	-1.547768	0.970243	-0.505775	-1.002804
2	-1.731185	-0.995885	-1.536794	-1.095988	0.293517	1.032908	1.333053	2.527057	0.646092	-1.030670	1.977165	0.997204
3	-1.730838	0.144767	0.501521	-1.095988	0.007457	-1.387538	-1.225848	0.807737	-1.547768	-1.030670	-0.505775	0.997204
4	-1.730492	0.652659	2.063884	-1.095988	0.388871	-1.041760	0.785728	-0.911583	0.646092	0.970243	-0.505775	-1.002804

TRAIN AND TEST DATA

In [74]:
```
from sklearn.model_selection import train_test_split
X_train,X_test,y_train,y_test =train_test_split(X_scaled,y, test_size=0.3,random_state=0)
```

In [66]:
```
X_train.shape
```

Out[66]:
```
(7000, 14)
```

In [67]:
```
X_test.shape
```

Out[67]:
```
(3000, 14)
```

In [68]:
```
y_train.shape
```

Out[68]:
```
(7000,)
```

In [69]:
```
y_test.shape
```

Out[69]:
```
(3000,)
```