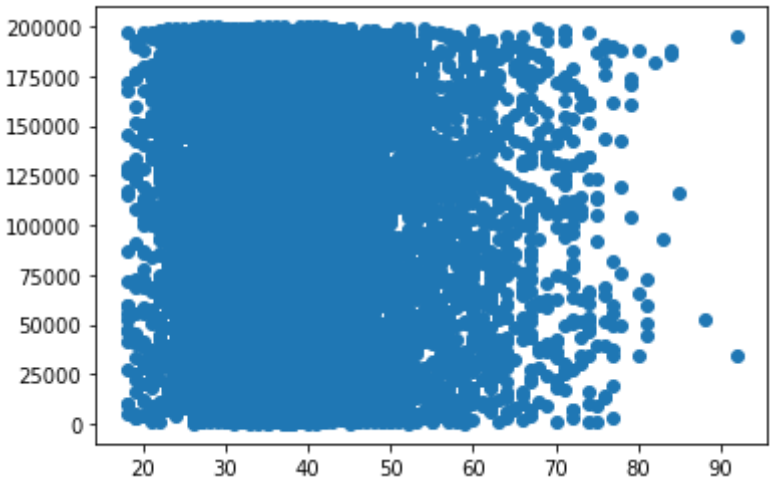
In [1]:
```
# import libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
```

In [3]:
```
# load the dataset
df = pd.read_csv("Churn_Modelling.csv")
```

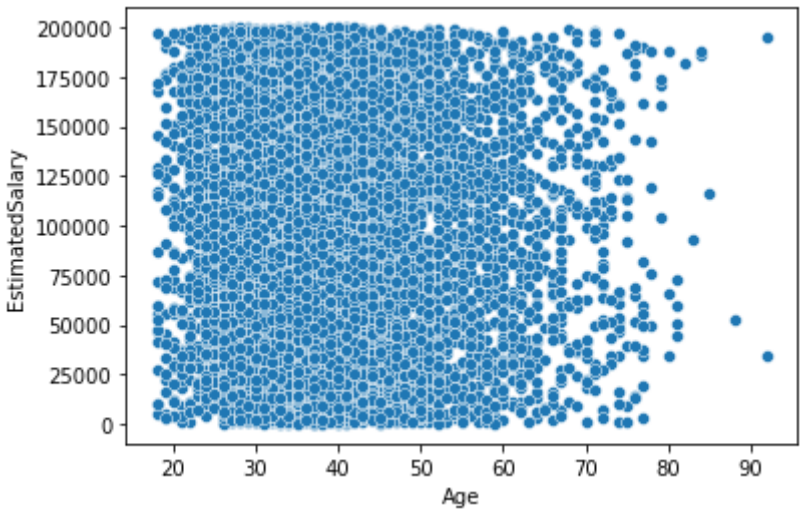
In [4]:
```
import matplotlib.pyplot as plt
plt.scatter(df.Age,df.EstimatedSalary)
```

Out[4]:
```
<matplotlib.collections.PathCollection at 0x214a67dbbe0>
```



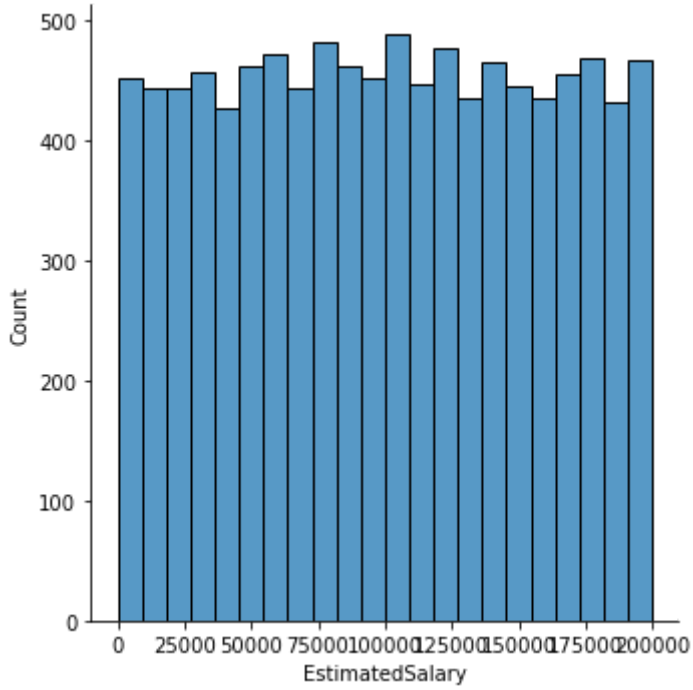
In [5]:
```
import matplotlib.pyplot as plt
import seaborn as sns
sns.scatterplot(x = df.Age,y = df.EstimatedSalary)
```

Out[5]:
```
<AxesSubplot:xlabel='Age', ylabel='EstimatedSalary'>
```



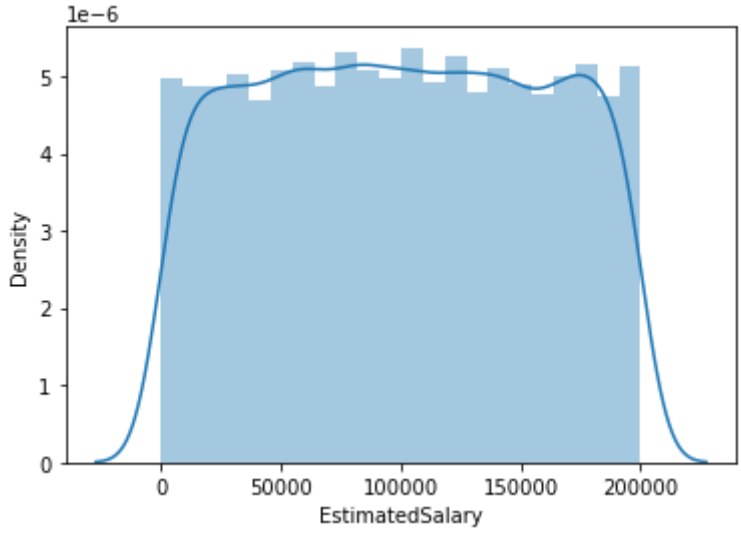
In [6]:
```
import matplotlib.pyplot as plt
import seaborn as sns
sns.displot(df["EstimatedSalary"])
```

Out[6]:
```
<seaborn.axisgrid.FacetGrid at 0x214a6b87760>
```



In [8]:
```
import matplotlib.pyplot as plt
import seaborn as sns
sns.distplot(df["EstimatedSalary"])
```

Out[8]:
```
<AxesSubplot:xlabel='EstimatedSalary', ylabel='Density'>
```

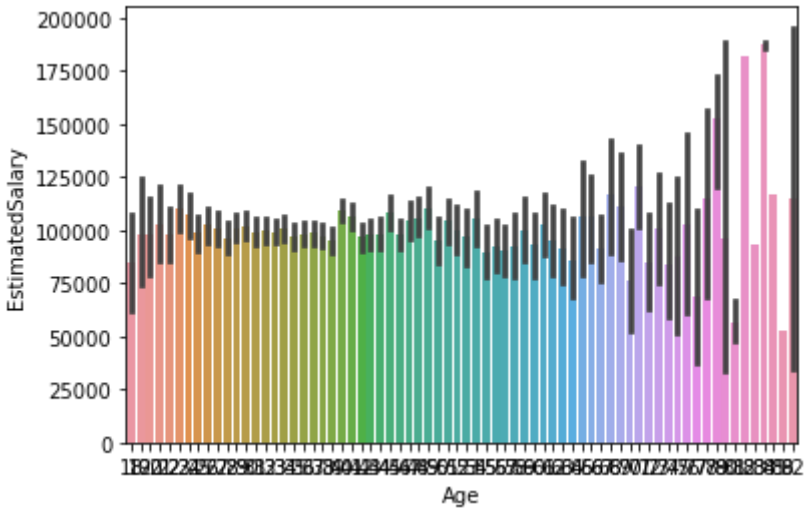


In [9]:
```
# import libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
```

In [21]:
```
# load the dataset
df = pd.read_csv("Churn_Modelling.csv")
```

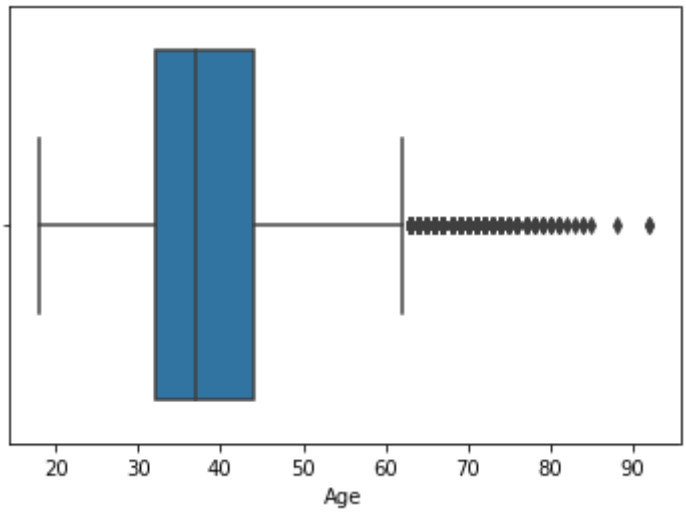
In [11]:
```
import matplotlib.pyplot as plt
import seaborn as sns
sns.barplot(df["Age"],df["EstimatedSalary"])
```

Out[11]:
```
<AxesSubplot:xlabel='Age', ylabel='EstimatedSalary'>
```



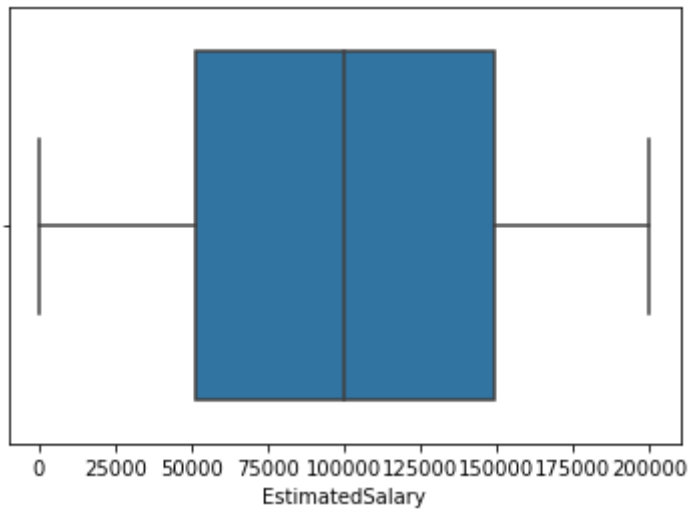
In [12]:
```
sns.boxplot(df["Age"])
```

Out[12]:
```
<AxesSubplot:xlabel='Age'>
```



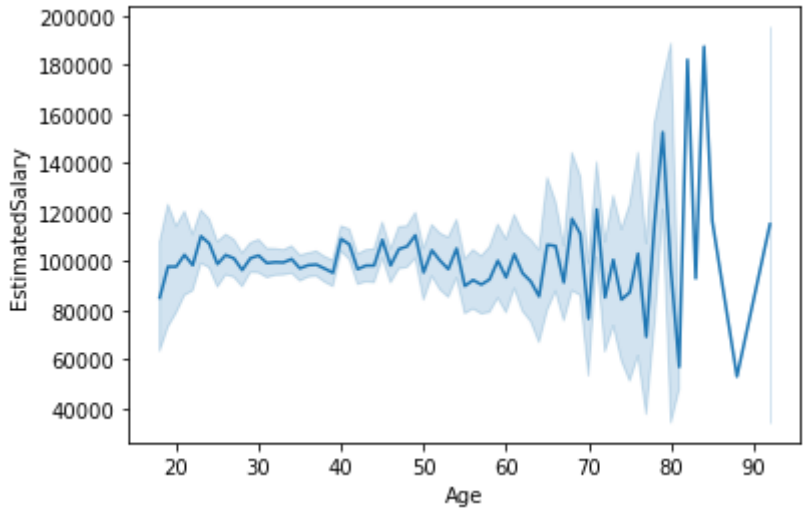
In [13]:
```
sns.boxplot(df["EstimatedSalary"])
```

Out[13]:
```
<AxesSubplot:xlabel='EstimatedSalary'>
```



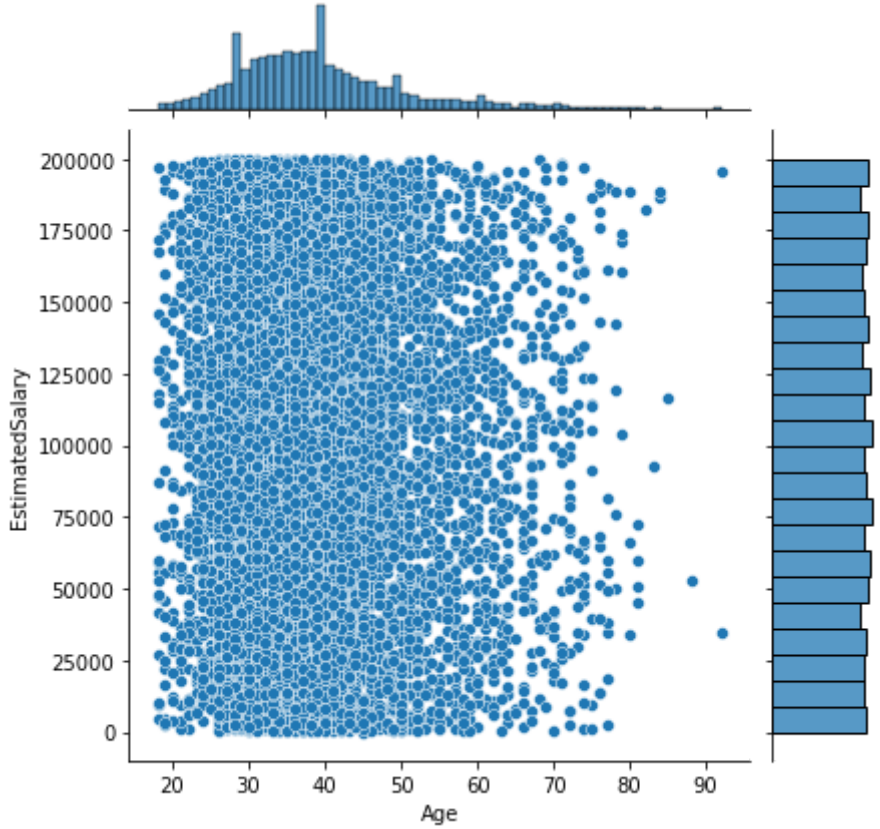
In [14]:
```
sns.lineplot(df["Age"],df["EstimatedSalary"])
```

Out[14]:
```
<AxesSubplot:xlabel='Age', ylabel='EstimatedSalary'>
```



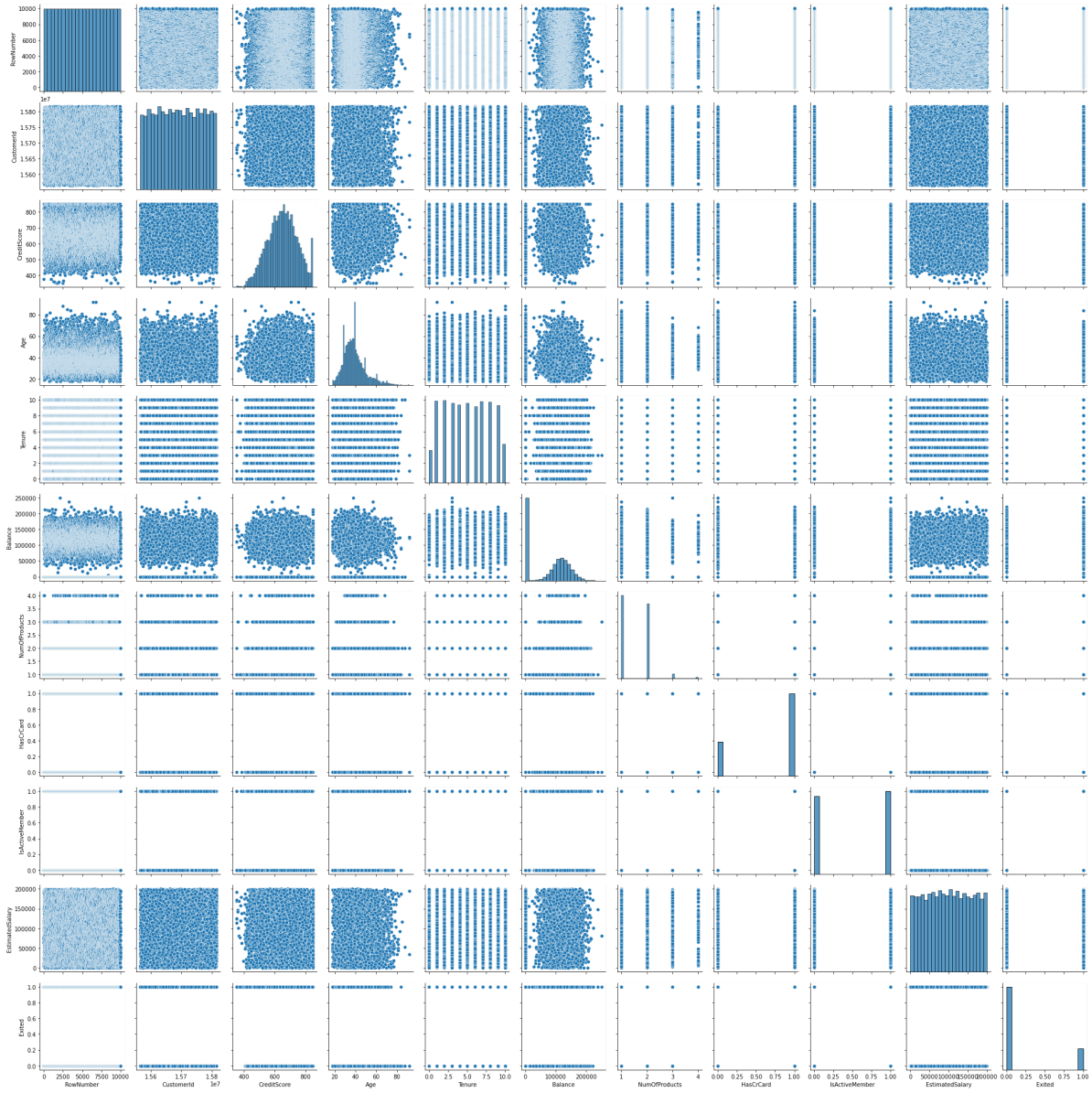
In [15]:
```
sns.jointplot(df["Age"],df["EstimatedSalary"])
```

Out[15]:
```
<seaborn.axisgrid.JointGrid at 0x214a6fd7ca0>
```



In [16]:
```
sns.pairplot(df)
```

Out[16]:
```
<seaborn.axisgrid.PairGrid at 0x214a71e4be0>
```



In [17]:
```
# descriptive statistics
df.describe()
```

Out[17]:

	RowNumber	CustomerId	CreditScore	Age	Tenure	Balance	Nur
count	10000.00000	1.000000e+04	10000.000000	10000.000000	10000.000000	10000.000000	1
mean	5000.50000	1.569094e+07	650.528800	38.921800	5.012800	76485.889288	
std	2886.89568	7.193619e+04	96.653299	10.487806	2.892174	62397.405202	
min	1.00000	1.556570e+07	350.000000	18.000000	0.000000	0.000000	
25%	2500.75000	1.562853e+07	584.000000	32.000000	3.000000	0.000000	
50%	5000.50000	1.569074e+07	652.000000	37.000000	5.000000	97198.540000	
75%	7500.25000	1.575323e+07	718.000000	44.000000	7.000000	127644.240000	
max	10000.00000	1.581569e+07	850.000000	92.000000	10.000000	250898.090000	

In [18]:
```
# handling missing values
df = pd.DataFrame({"Gender":[1,2,np.nan],"Geography":[1,np.nan,np.nan],"Bala
df
```

Out[18]:

	Gender	Geography	Balance
0	1.0	1.0	1
1	2.0	NaN	2
2	NaN	NaN	3

In [22]:
```
df.isnull().any()
```

Out[22]:
```
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 [23]:
```
qnt = df.quantile(q = (0.25,0.75))
qnt
```

Out[23]:

	RowNumber	CustomerId	CreditScore	Age	Tenure	Balance	NumOfProducts	HasCrCard
0.25	2500.75	15628528.25	584.0	32.0	3.0	0.00	1.0	0.0
0.75	7500.25	15753233.75	718.0	44.0	7.0	127644.24	2.0	1.0

In [24]:
```
iqr = qnt.loc[0.75] - qnt.loc[0.25]
iqr
```

Out[24]:
```
RowNumber          4999.5000
CustomerId       124705.5000
CreditScore         134.0000
Age                  12.0000
Tenure                4.0000
Balance          127644.2400
NumOfProducts         1.0000
HasCrCard             1.0000
IsActiveMember        1.0000
EstimatedSalary   98386.1375
Exited                0.0000
dtype: float64
```

In [25]:
```
lower = qnt.loc [0.25] - 1.5*iqr
lower
```

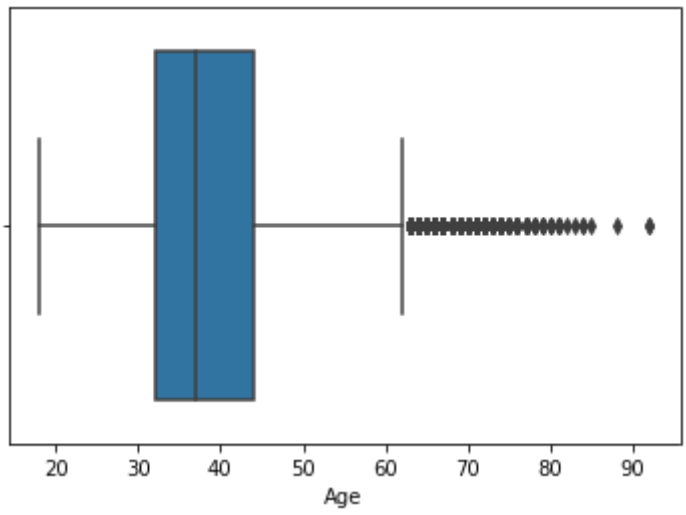
Out[25]:
```
RowNumber          -4.998500e+03
CustomerId          1.544147e+07
CreditScore         3.830000e+02
Age                 1.400000e+01
Tenure             -3.000000e+00
Balance            -1.914664e+05
NumOfProducts      -5.000000e-01
HasCrCard          -1.500000e+00
IsActiveMember     -1.500000e+00
EstimatedSalary    -9.657710e+04
Exited              0.000000e+00
dtype: float64
```

In [26]:
```
upper =qnt.loc[0.75] + 1.5*iqr
upper
```

Out[26]:
```
RowNumber          1.499950e+04
CustomerId         1.594029e+07
CreditScore        9.190000e+02
Age                6.200000e+01
Tenure             1.300000e+01
Balance            3.191106e+05
NumOfProducts      3.500000e+00
HasCrCard          2.500000e+00
IsActiveMember     2.500000e+00
EstimatedSalary    2.969675e+05
Exited             0.000000e+00
dtype: float64
```

In [27]:
```
sns.boxplot(df["Age"])
```

Out[27]:
```
<AxesSubplot:xlabel='Age'>
```



In [28]:
```
df["Age"] = np.where(df["Age"]>87,40,df["Age"])
df["EstimatedSalary"] = np.where(df["EstimatedSalary"]>45,31,df["EstimatedSa
```

In [29]:
```
df
```

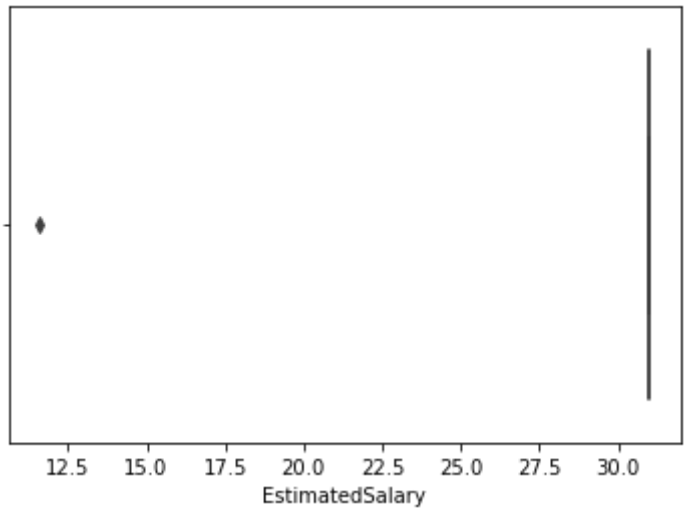
Out[29]:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Bal
0	1	15634602	Hargrave	619	France	Female	42	2	
1	2	15647311	Hill	608	Spain	Female	41	1	838(
2	3	15619304	Onio	502	France	Female	42	8	15966
3	4	15701354	Boni	699	France	Female	39	1	
4	5	15737888	Mitchell	850	Spain	Female	43	2	1255'
...	...	...	...	...	...	...	...	...	
9995	9996	15606229	Obijiaku	771	France	Male	39	5	
9996	9997	15569892	Johnstone	516	France	Male	35	10	5736
9997	9998	15584532	Liu	709	France	Female	36	7	
9998	9999	15682355	Sabbatini	772	Germany	Male	42	3	7507
9999	10000	15628319	Walker	792	France	Female	28	4	13014

10000 rows × 14 columns

In [30]:
```
sns.boxplot(df["EstimatedSalary"])
```

Out[30]:
```
<AxesSubplot:xlabel='EstimatedSalary'>
```



In [31]:
```
df.head(2)
```

Out[31]:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance
0	1	15634602	Hargrave	619	France	Female	42	2	0.00
1	2	15647311	Hill	608	Spain	Female	41	1	83807.86

In [32]:
```
df_main = pd.get_dummies(df,columns =["EstimatedSalary"])
df_main
```

Out[32]:

	RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Bal
0	1	15634602	Hargrave	619	France	Female	42	2	
1	2	15647311	Hill	608	Spain	Female	41	1	838(
2	3	15619304	Onio	502	France	Female	42	8	15966
3	4	15701354	Boni	699	France	Female	39	1	
4	5	15737888	Mitchell	850	Spain	Female	43	2	1255
...	...	...	...	...	...	...	...	...	
9995	9996	15606229	Obijiaku	771	France	Male	39	5	
9996	9997	15569892	Johnstone	516	France	Male	35	10	5736
9997	9998	15584532	Liu	709	France	Female	36	7	
9998	9999	15682355	Sabbatini	772	Germany	Male	42	3	7507
9999	10000	15628319	Walker	792	France	Female	28	4	13014

10000 rows × 15 columns

In [33]:
```
# split x & y
x = df.iloc[:,0:1]
x
```

Out[33]:

	RowNumber
0	1
1	2
2	3
3	4
4	5
...	...
9995	9996
9996	9997
9997	9998
9998	9999
9999	10000

10000 rows × 1 columns

In [34]:
```
y = df.iloc[:,1:]
y
```

Out[34]:

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

10000 rows × 13 columns

In [35]:
```
# train test split
from sklearn.model_selection import train_test_split
```

In [36]:
```
x_train,x_test,y_train,y_test = train_test_split(x,y,test_size=0.2,random_st
x_train.shape,x_test.shape,y_train.shape,y_test.shape
```

Out[36]:
```
((8000, 1), (2000, 1), (8000, 13), (2000, 13))
```

In [37]:
```
x_test
```

Out[37]:

	RowNumber
9394	9395
898	899
2398	2399
5906	5907
2343	2344
...	...
1037	1038
2899	2900
9549	9550
2740	2741
6690	6691

2000 rows × 1 columns

In [38]:
```
x_train
```

Out[38]:

	RowNumber
7389	7390
9275	9276
2995	2996
5316	5317
356	357
...	...
9225	9226
4859	4860
3264	3265
9845	9846
2732	2733

8000 rows × 1 columns

In [39]:
```
y_test
```

Out[39]:

	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfI
9394	15615753	Upchurch	597	Germany	Female	35	8	131101.04	
898	15654700	Fallaci	523	France	Female	40	2	102967.41	
2398	15633877	Morrison	706	Spain	Female	42	8	95386.82	
5906	15745623	Worsnop	788	France	Male	32	4	112079.58	
2343	15765902	Gibson	706	Germany	Male	38	5	163034.82	
...	...	...	...	...	...	...	...	...	
1037	15631054	Volkova	625	France	Female	24	1	0.00	
2899	15810944	Bryant	586	France	Female	35	7	0.00	
9549	15772604	Chiemezie	578	Spain	Male	36	1	157267.95	
2740	15787699	Burke	650	Germany	Male	34	4	142393.11	
6690	15579223	Niu	573	Germany	Male	30	8	127406.50	

2000 rows × 13 columns

In [40]:
```
y_train
```

Out[40]:

	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance
7389	15676909	Mishin	667	Spain	Female	34	5	0.00
9275	15749265	Carslaw	427	Germany	Male	42	1	75681.52
2995	15582492	Moore	535	France	Female	29	2	112367.34
5316	15780386	Ferri	654	Spain	Male	40	5	105683.63
356	15611759	Simmons	850	Spain	Female	57	8	126776.30
...	...	...	...	...	...	...	...	...
9225	15584928	Ugochukwutubelum	594	Germany	Female	32	4	120074.97
4859	15647111	White	794	Spain	Female	22	4	114440.24
3264	15574372	Hoolan	738	France	Male	35	5	161274.05
9845	15664035	Parsons	590	Spain	Female	38	9	0.00
2732	15592816	Udokamma	623	Germany	Female	48	1	108076.33

8000 rows × 13 columns

In [ ]: