In [1]:

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

In [2]:

```
data=pd.read_csv('https://raw.githubusercontent.com/shivang98/Social-Network-ads-Bo
```

In [3]:

```
data
```

Out[3]:

	User ID	Gender	Age	EstimatedSalary	Purchased
0	15624510	Male	19	19000	0
1	15810944	Male	35	20000	0
2	15668575	Female	26	43000	0
3	15603246	Female	27	57000	0
4	15804002	Male	19	76000	0
...	...	...	...	...	...
395	15691863	Female	46	41000	1
396	15706071	Male	51	23000	1
397	15654296	Female	50	20000	1
398	15755018	Male	36	33000	0
399	15594041	Female	49	36000	1

400 rows × 5 columns

In [4]:

```
data.isna().sum()
```

Out[4]:

```
User ID            0
Gender             0
Age                0
EstimatedSalary    0
Purchased          0
dtype: int64
```

In [56]:

```
data['Purchased'].value_counts()
#Data is Inconsistence
```

Out[56]:

```
0    257
1    143
Name: Purchased, dtype: int64
```

In [6]:

```
data.dtypes
```

Out[6]:

```
User ID             int64
Gender             object
Age                 int64
EstimatedSalary     int64
Purchased           int64
dtype: object
```

In [7]:

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 400 entries, 0 to 399
Data columns (total 5 columns):
 #   Column           Non-Null Count  Dtype
---  ------           --------------  -----
 0   User ID          400 non-null    int64
 1   Gender           400 non-null    object
 2   Age              400 non-null    int64
 3   EstimatedSalary  400 non-null    int64
 4   Purchased        400 non-null    int64
dtypes: int64(4), object(1)
memory usage: 15.8+ KB
```

In [8]:

```
data.describe()
```

Out[8]:

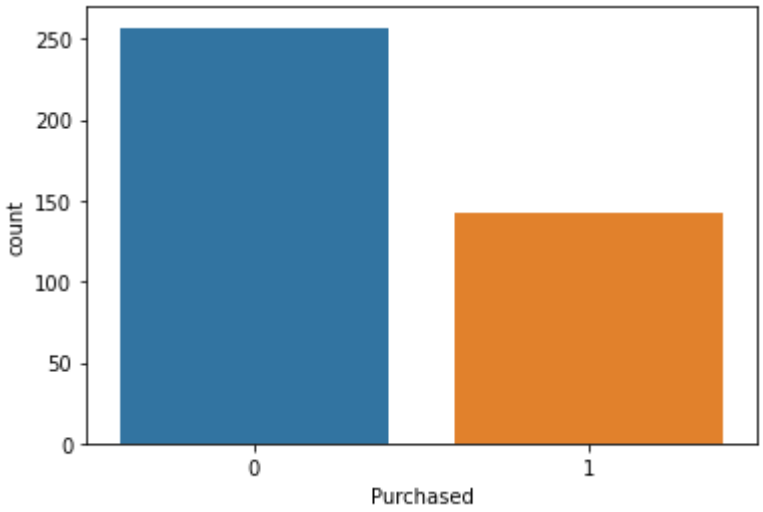
	User ID	Age	EstimatedSalary	Purchased
count	4.000000e+02	400.000000	400.000000	400.000000
mean	1.569154e+07	37.655000	69742.500000	0.357500
std	7.165832e+04	10.482877	34096.960282	0.479864
min	1.556669e+07	18.000000	15000.000000	0.000000
25%	1.562676e+07	29.750000	43000.000000	0.000000
50%	1.569434e+07	37.000000	70000.000000	0.000000
75%	1.575036e+07	46.000000	88000.000000	1.000000
max	1.581524e+07	60.000000	150000.000000	1.000000

In [9]:

```
sns.countplot(x=data['Purchased'])
```

Out[9]:

```
<AxesSubplot:xlabel='Purchased', ylabel='count'>
```

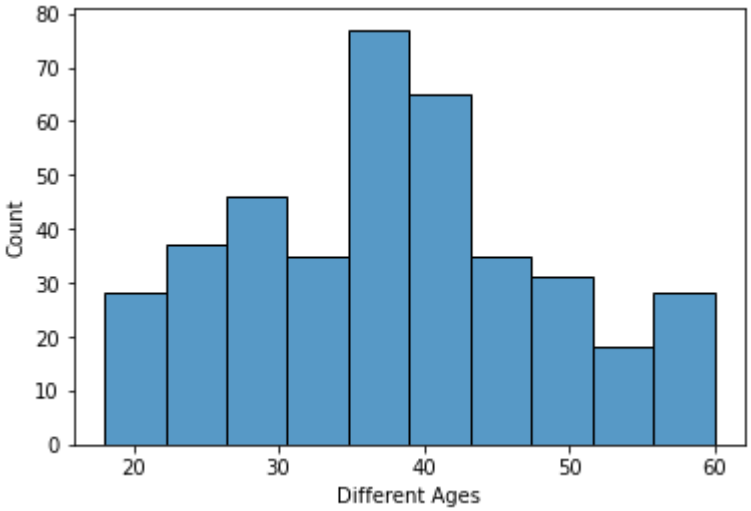


In [10]:

```
sns.histplot(x=data['Age'])
plt.xlabel('Different Ages')
```

Out[10]:

```
Text(0.5, 0, 'Different Ages')
```



In [11]:

```
#Age and Salary
```

In [57]:

```
X = data.iloc[:,[2,3]].values
print(X)
```

```
[[    19  19000]
 [    35  20000]
 [    26  43000]
 [    27  57000]
 [    19  76000]
 [    27  58000]
 [    27  84000]
 [    32 150000]
 [    25  33000]
 [    35  65000]
 [    26  80000]
 [    26  52000]
 [    20  86000]
 [    32  18000]
 [    18  82000]
 [    29  80000]
 [    47  25000]
 [    45  26000]
 [    46  28000]
```

In [ ]:

```

```

In [58]:

```
#Purchased
y = data.iloc[:,4].values
print(y)
#Values are ranges from 0 and 1
```

```
[0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 1 0 0 0
0 0
 0 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 1 0 0 0 0 0 0 0 0
0 0
 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 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 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
1 0
 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 1 0 0 0 0 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 1 0 1 0 1 0 1 0 1 1 0 0 0 1 0 0 0 1
0 1
 1 1 0 0 1 1 0 1 1 0 1 1 0 1 0 0 0 1 1 0 1 1 0 1 0 1 0 1 0 0 1 1 0 1 0
0 1
 1 0 1 1 0 1 1 0 0 1 0 0 1 1 1 1 1 0 1 1 1 1 0 1 1 0 1 0 1 0 1 1 1 1 0
0 0
 1 1 0 1 1 1 1 1 1 0 0 0 1 1 0 0 1 0 1 0 1 1 0 1 0 1 1 0 1 1 0 0 0 1 1 0
1 0
 0 1 0 1 0 0 1 1 0 0 1 1 0 1 1 0 0 1 0 1 0 1 1 1 0 1 0 1 1 1 0 1 1 1 1
0 1
 1 1 0 1 0 1 0 0 1 1 0 1 1 1 1 1 1 0 1 1 1 1 1 1 0 1 1 1 0 1]
```

In [14]:

```
from sklearn.model_selection import train_test_split
```

In [15]:

```
X_train, X_test, y_train, y_test = train_test_split(X,y, test_size = 0.25, random_s
```

In [16]:

```
from sklearn.linear_model import LogisticRegression
logic=LogisticRegression()
```

In [17]:

```
logic.fit(X_train,y_train)
```

Out[17]:

```
LogisticRegression()
```

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On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [18]:

```
y_pred = logic.predict(X_test)
```

In [19]:

```
print(y_test)
```

```
[0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 1 0 1 0 0 0 0 0 1 1 0 0
0 0
 0 0 1 0 0 0 0 1 0 0 1 0 1 1 0 0 0 1 1 0 0 1 0 0 1 0 1 0 1 0 0 0 0 1 0
0 1
 0 0 0 0 1 1 1 0 0 0 1 1 0 1 1 0 0 1 0 0 0 1 0 1 1 1]
```

In [20]:

```
print(y_pred)
```

```
[0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0 0
 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]
```

In [21]:

```
print(y)
```

```
[0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 0 0 0 1 0 0 0
0 0
 0 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 1 0 0 0 0 0 0 0 0
0 0
 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 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 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0
1 0
 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 1 0 0 0 0 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 1 0 1 0 1 0 1 0 1 1 0 0 0 1 0 0 0 1
0 1
 1 1 0 0 1 1 0 1 1 0 1 1 0 1 0 0 0 1 1 0 1 1 0 1 0 1 0 1 0 0 1 1 0 1 0
0 1
 1 0 1 1 0 1 1 0 0 1 0 0 1 1 1 1 1 0 1 1 1 1 0 1 1 0 1 0 1 0 1 1 1 1 0
0 0
 1 1 0 1 1 1 1 1 1 0 0 0 1 1 0 0 1 0 1 0 1 1 0 1 0 1 1 0 1 1 0 0 0 1 1 0
1 0
 0 1 0 1 0 0 1 1 0 0 1 1 0 1 1 0 0 1 0 1 0 1 1 1 0 1 0 1 1 1 0 1 1 1 1
0 1
 1 1 0 1 0 1 0 0 1 1 0 1 1 1 1 1 1 0 1 1 1 1 1 1 0 1 1 1 0 1]
```

In [22]:

```
from sklearn.metrics import confusion_matrix
cm=confusion_matrix(y_test,y_pred)
```

In [23]:

```
cm
```

Out[23]:

```
array([[68,  0],
       [32,  0]])
```

In [24]:

```
from sklearn.metrics import classification_report
```

In [25]:

```
print(classification_report(y_test,y_pred))
```

```
              precision    recall  f1-score   support

           0       0.68      1.00      0.81        68
           1       0.00      0.00      0.00        32

    accuracy                           0.68       100
   macro avg       0.34      0.50      0.40       100
weighted avg       0.46      0.68      0.55       100


/home/ubuntu/.local/lib/python3.10/site-packages/sklearn/metrics/_clas
sification.py:1334: UndefinedMetricWarning: Precision and F-score are
ill-defined and being set to 0.0 in labels with no predicted samples.
Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
/home/ubuntu/.local/lib/python3.10/site-packages/sklearn/metrics/_clas
sification.py:1334: UndefinedMetricWarning: Precision and F-score are
ill-defined and being set to 0.0 in labels with no predicted samples.
Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
/home/ubuntu/.local/lib/python3.10/site-packages/sklearn/metrics/_clas
sification.py:1334: UndefinedMetricWarning: Precision and F-score are
ill-defined and being set to 0.0 in labels with no predicted samples.
Use `zero_division` parameter to control this behavior.
  _warn_prf(average, modifier, msg_start, len(result))
```

In [26]:

```
from sklearn.preprocessing import StandardScaler
```

In [27]:

```
ss=StandardScaler()
```

The fit() method helps in fitting the data into a model.

transform() method helps in transforming the data into a form that is more suitable for the model.

In [28]:

```
X_train=ss.fit_transform(X_train)
```

In [29]:

```
X_test=ss.transform(X_test)
```

In [30]:

```
logic.fit(X_train,y_train)
```

Out[30]:

LogisticRegression()

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In [31]:

```
y_pred = logic.predict(X_test)
```

In [32]:

```
print(y_pred)
```

```
[0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 1 0 0 1 0 1 0 1 0 0 0 0 0 0 1 0 0
0 0
 0 0 1 0 0 0 0 1 0 0 1 0 1 1 0 0 0 1 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 1 0
0 0
 0 0 1 0 1 1 1 1 0 0 1 1 0 1 0 0 0 1 0 0 0 0 0 0 1 1]
```

In [33]:

```
print(y_test)
```

```
[0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 1 0 1 0 1 0 0 0 0 0 1 1 0 0
0 0
 0 0 1 0 0 0 0 1 0 0 1 0 1 1 0 0 0 1 1 0 0 1 0 0 1 0 1 0 1 0 0 0 0 1 0
0 1
 0 0 0 0 1 1 1 0 0 0 1 1 0 1 1 0 0 1 0 0 0 1 0 1 1 1]
```

In [55]:

```
cm=confusion_matrix(y_test,y_pred)
print(cm)
```

```
[[65  3]
 [ 8 24]]
```

In [54]:

```
report=classification_report(y_test,y_pred)
print(classification_report(y_test,y_pred))
```

```
              precision    recall  f1-score   support

           0       0.89      0.96      0.92        68
           1       0.89      0.75      0.81        32

    accuracy                           0.89       100
   macro avg       0.89      0.85      0.87       100
weighted avg       0.89      0.89      0.89       100
```

In [53]:

```
from sklearn.metrics import precision_score
precision_score(y_test,y_pred)
```

Out[53]:

```
0.8888888888888888
```

In [46]:

```
from sklearn.metrics import accuracy_score
```

In [52]:

```
accuracy=accuracy_score(y_test,y_pred)
accuracy
```

Out[52]:

```
0.89
```

In [51]:

```
error_rate=1-accuracy
error_rate
```

Out[51]:

```
0.10999999999999999
```

In [ ]:

```

```