```
In [1]:  import numpy as np
         import pandas as pd
         import seaborn as sns
```

```
In [2]:
```

```
In [3]:  df_train=pd.read_csv("C8_loan-train.csv")
         df_test=pd.read_csv("C8_loan-test.csv")
```

Out[3]:

|   | Loan_ID | Gender | Married | Dependents | Education | Self_Employed | ApplicantIncome | Coap |
|---|---------|--------|---------|------------|-----------|---------------|-----------------|------|
| 0 | LP001002 | Male | No | 0 | Graduate | No | 5849 | |
| 1 | LP001003 | Male | Yes | 1 | Graduate | No | 4583 | |
| 2 | LP001005 | Male | Yes | 0 | Graduate | Yes | 3000 | |
| 3 | LP001006 | Male | Yes | 0 | Not Graduate | No | 2583 | |
| 4 | LP001008 | Male | No | 0 | Graduate | No | 6000 | |
| ... | ... | ... | ... | ... | ... | ... | ... | |
| 609 | LP002978 | Female | No | 0 | Graduate | No | 2900 | |
| 610 | LP002979 | Male | Yes | 3+ | Graduate | No | 4106 | |
| 611 | LP002983 | Male | Yes | 1 | Graduate | No | 8072 | |
| 612 | LP002984 | Male | Yes | 2 | Graduate | No | 7583 | |
| 613 | LP002990 | Female | No | 0 | Graduate | Yes | 4583 | |

614 rows × 13 columns

```
In [4]:
```

Out[4]:

|   | Loan_ID | Gender | Married | Dependents | Education | Self_Employed | ApplicantIncome | Coap |
|---|---------|--------|---------|------------|-----------|---------------|-----------------|------|
| 0 | LP001015 | Male | Yes | 0 | Graduate | No | 5720 | |
| 1 | LP001022 | Male | Yes | 1 | Graduate | No | 3076 | |
| 2 | LP001031 | Male | Yes | 2 | Graduate | No | 5000 | |
| 3 | LP001035 | Male | Yes | 2 | Graduate | No | 2340 | |
| 4 | LP001051 | Male | No | 0 | Not Graduate | No | 3276 | |
| ... | ... | ... | ... | ... | ... | ... | ... | |
| 362 | LP002971 | Male | Yes | 3+ | Not Graduate | Yes | 4009 | |
| 363 | LP002975 | Male | Yes | 0 | Graduate | No | 4158 | |
| 364 | LP002980 | Male | No | 0 | Graduate | No | 3250 | |
| 365 | LP002986 | Male | Yes | 0 | Graduate | No | 5000 | |
| 366 | LP002989 | Male | No | 0 | Graduate | Yes | 9200 | |

In [5]:

In [6]:

In [7]:

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 480 entries, 1 to 613
Data columns (total 13 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   Loan_ID            480 non-null    object
 1   Gender             480 non-null    object
 2   Married            480 non-null    object
 3   Dependents         480 non-null    object
 4   Education          480 non-null    object
 5   Self_Employed      480 non-null    object
 6   ApplicantIncome    480 non-null    int64
 7   CoapplicantIncome  480 non-null    float64
 8   LoanAmount         480 non-null    float64
 9   Loan_Amount_Term   480 non-null    float64
 10  Credit_History     480 non-null    float64
 11  Property_Area      480 non-null    object
 12  Loan_Status        480 non-null    object
dtypes: float64(4), int64(1), object(8)
memory usage: 52.5+ KB
```

In [8]:

Out[8]: Index(['Loan_ID', 'Gender', 'Married', 'Dependents', 'Education',
               'Self_Employed', 'ApplicantIncome', 'CoapplicantIncome', 'LoanAmount',
               'Loan_Amount_Term', 'Credit_History', 'Property_Area', 'Loan_Status'],
              dtype='object')

In [9]:
```python
feature_matrix=df1[['ApplicantIncome', 'CoapplicantIncome', 'LoanAmount',
        'Loan_Amount_Term', 'Credit_History']]
```

In [10]:

Out[10]: (480, 5)

In [11]:

Out[11]: (480, 1)

In [12]:

In [13]:

In [14]: 
```
logr=LogisticRegression()
```
```
C:\ProgramData\Anaconda3\lib\site-packages\sklearn\utils\validation.py:63: Da
taConversionWarning: A column-vector y was passed when a 1d array was expecte
d. Please change the shape of y to (n_samples, ), for example using ravel().
  return f(*args, **kwargs)
```

Out[14]: LogisticRegression()

In [15]: 
```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 289 entries, 0 to 366
Data columns (total 12 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   Loan_ID            289 non-null    object
 1   Gender             289 non-null    object
 2   Married            289 non-null    object
 3   Dependents         289 non-null    object
 4   Education          289 non-null    object
 5   Self_Employed      289 non-null    object
 6   ApplicantIncome    289 non-null    int64
 7   CoapplicantIncome  289 non-null    int64
 8   LoanAmount         289 non-null    float64
 9   Loan_Amount_Term   289 non-null    float64
 10  Credit_History     289 non-null    float64
 11  Property_Area      289 non-null    object
dtypes: float64(3), int64(2), object(7)
memory usage: 29.4+ KB
```

In [16]: 

Out[16]: 
```
Index(['Loan_ID', 'Gender', 'Married', 'Dependents', 'Education',
       'Self_Employed', 'ApplicantIncome', 'CoapplicantIncome', 'LoanAmount',
       'Loan_Amount_Term', 'Credit_History', 'Property_Area'],
      dtype='object')
```

In [17]: 
```
observation=df2[['ApplicantIncome', 'CoapplicantIncome', 'LoanAmount',
```

```
In [18]: prediction=logr.predict(observation)
```

```
['Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'No' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes' 'Yes'
 'Yes']
```

```
In [19]:
```

```
Out[19]: array(['No', 'Yes'], dtype=object)
```

```
In [20]:
```

```
Out[20]: array([[0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
                 [0.        , 1.        ],
```

In [21]:

Out[21]: 0.0