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STEP 1:

In [2]:
```
import pandas as pd
```

In [3]:
```
df=pd.read_csv("train_loan.csv")
df
```

Out[3]:

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome
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
5	LP001011	Male	Yes	2	Graduate	Yes	5417
6	LP001013	Male	Yes	0	Not Graduate	No	2333
7	LP001014	Male	Yes	3+	Graduate	No	3036
8	LP001018	Male	Yes	2	Graduate	No	4006
9	LP001020	Male	Yes	1	Graduate	No	12841

In [4]:
```
df.head()
```

Out[4]:

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	Coapp
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	

In [5]:
```
df.shape
```

Out[5]:
```
(614, 13)
```

In [26]:
```
df.columns
```

Out[26]:
```
Index(['Loan_ID', 'Gender', 'Married', 'Dependents', 'Education',
       'Self_Employed', 'ApplicantIncome', 'CoapplicantIncome', 'LoanAmoun
t',
       'Loan_Amount_Term', 'Credit_History', 'Property_Area'],
      dtype='object')
```

In [27]:
```
df.dtypes
```

Out[27]:
```
Loan_ID               object
Gender                object
Married               object
Dependents             int64
Education             object
Self_Employed         object
ApplicantIncome        int64
CoapplicantIncome    float64
LoanAmount           float64
Loan_Amount_Term     float64
Credit_History       float64
Property_Area         object
dtype: object
```

In [28]:
```
df.info
```

Out[28]:
```
<bound method DataFrame.info of       Loan_ID  Gender Married  Dependents
Education Self_Employed  \
0    LP001002    Male      No           0      Graduate            No
1    LP001003    Male     Yes           1      Graduate            No
2    LP001005    Male     Yes           0      Graduate           Yes
3    LP001006    Male     Yes           0  Not Graduate            No
4    LP001008    Male      No           0      Graduate            No
5    LP001011    Male     Yes           2      Graduate           Yes
6    LP001013    Male     Yes           0  Not Graduate            No
7    LP001014    Male     Yes           3      Graduate            No
8    LP001018    Male     Yes           2      Graduate            No
9    LP001020    Male     Yes           1      Graduate            No
10   LP001024    Male     Yes           2      Graduate            No
11   LP001027    Male     Yes           2      Graduate            No
12   LP001028    Male     Yes           2      Graduate            No
13   LP001029    Male      No           0      Graduate            No
14   LP001030    Male     Yes           2      Graduate            No
15   LP001032    Male      No           0      Graduate            No
16   LP001034    Male      No           1  Not Graduate            No
```

In [29]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 614 entries, 0 to 613
Data columns (total 12 columns):
Loan_ID              614 non-null object
Gender               614 non-null object
Married              614 non-null object
Dependents           614 non-null int64
Education            614 non-null object
Self_Employed        614 non-null object
ApplicantIncome      614 non-null int64
CoapplicantIncome    614 non-null float64
LoanAmount           614 non-null float64
Loan_Amount_Term     614 non-null float64
Credit_History       614 non-null float64
Property_Area        614 non-null object
dtypes: float64(4), int64(2), object(6)
memory usage: 57.6+ KB
```

In [30]:
```
df.Gender.value_counts
```

Out[30]:
```
<bound method IndexOpsMixin.value_counts of 0        Male
1          Male
2          Male
3          Male
4          Male
5          Male
6          Male
7          Male
8          Male
9          Male
10         Male
11         Male
12         Male
13         Male
14         Male
15         Male
16         Male
17       Female
18         Male
19         Male
20         Male
21         Male
22         Male
23         Male
24         Male
25         Male
26         Male
27         Male
28         Male
29       Female
          ...
584        Male
585        Male
586        Male
587      Female
588        Male
589        Male
590        Male
591        Male
592        Male
593        Male
594        Male
595        Male
596        Male
597        Male
598        Male
599        Male
600      Female
601        Male
602        Male
603        Male
604      Female
605        Male
606        Male
607        Male
608        Male
609      Female
```

```
610      Male
611      Male
612      Male
613    Female
Name: Gender, Length: 614, dtype: object>
```

STEP 2:

In [6]:
```
df["Dependents"].fillna("NO_dep",inplace=True)
```

In [7]:
```
df["Dependents"]
```

Out[7]:

0	0
1	1
2	0
3	0
4	0
5	2
6	0
7	3+
8	2
9	1
10	2
11	2
12	2
13	0
14	2
15	0
16	1
17	0
18	0
19	0
20	0
21	1
22	0
23	2
24	1
25	0
26	0
27	2
28	0
29	2
...	
584	1
585	1
586	0
587	0
588	0
589	2
590	0
591	2
592	3+
593	0
594	0
595	0
596	2
597	NO_dep
598	0
599	2
600	3+
601	0
602	3+
603	0
604	1
605	0
606	1
607	2
608	0
609	0

```
610        3+
611         1
612         2
613         0
Name: Dependents, Length: 614, dtype: object
```

In [24]:
```
dept={"0":0,"1":1,"2":2,"3+":3,"NO_dep":0}
df.Dependents=[dept[item]for item in df.Dependents]
```

In [25]:
```
df['Dependents'].astype(int)
```

Out[25]:

0	0
1	1
2	0
3	0
4	0
5	2
6	0
7	3
8	2
9	1
10	2
11	2
12	2
13	0
14	2
15	0
16	1
17	0
18	0
19	0
20	0
21	1
22	0
23	2
24	1
25	0
26	0
27	2
28	0
29	2
..	..
584	1
585	1
586	0
587	0
588	0
589	2
590	0
591	2
592	3
593	0
594	0
595	0
596	2
597	0
598	0
599	2
600	3
601	0
602	3
603	0
604	1
605	0
606	1
607	2
608	0
609	0

```
610    3
611    1
612    2
613    0
Name: Dependents, Length: 614, dtype: int32
```

In [8]:
```
df['Gender'].fillna(df["Gender"].mode()[0],inplace=True)
df['Married'].fillna(df['Married'].mode()[0],inplace=True)
df['Dependents'].fillna(df['Dependents'].mode()[0],inplace=True)
df['Education'].fillna(df['Education'].mode()[0],inplace=True)
df['Self_Employed'].fillna(df['Self_Employed'].mode()[0],inplace=True)
df['Credit_History'].fillna(df['Credit_History'].mode()[0],inplace=True)
```

In [9]:
```
df['LoanAmount'].fillna(df['LoanAmount'].mean(),inplace=True)
df['Loan_Amount_Term'].fillna(df['Loan_Amount_Term'].mean(),inplace=True)
```

In [10]:
```
df.drop(["Loan_ID"],axis=1)
```

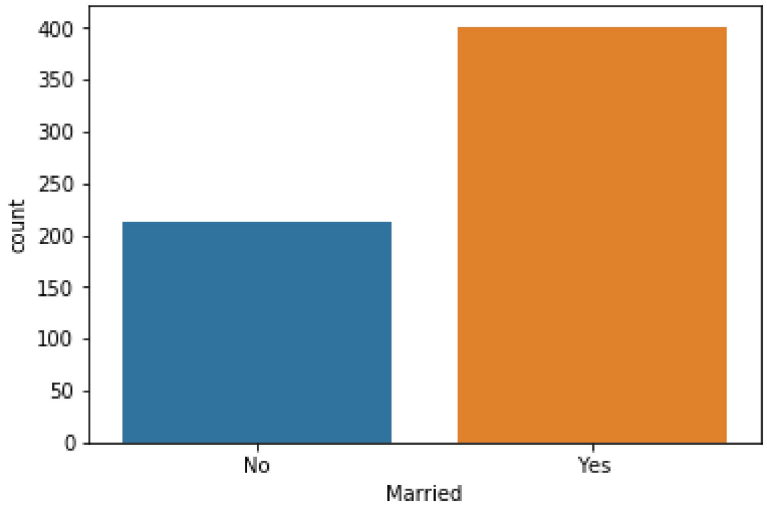
Out[10]:

	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	Coapplican
0	Male	No	0	Graduate	No	5849	
1	Male	Yes	1	Graduate	No	4583	
2	Male	Yes	0	Graduate	Yes	3000	
3	Male	Yes	0	Not Graduate	No	2583	
4	Male	No	0	Graduate	No	6000	
5	Male	Yes	2	Graduate	Yes	5417	
6	Male	Yes	0	Not Graduate	No	2333	
7	Male	Yes	3+	Graduate	No	3036	
8	Male	Yes	2	Graduate	No	4006	
9	Male	Yes	1	Graduate	No	12841	

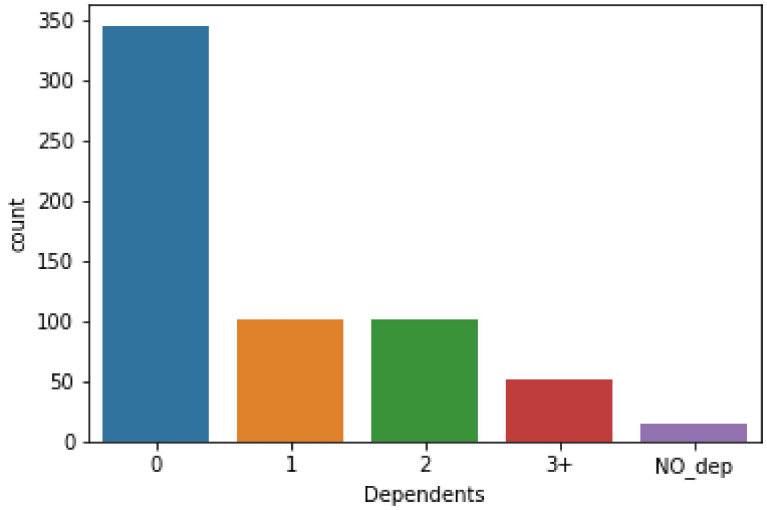
STEP 3:

In [11]:
```
import seaborn as sns
import matplotlib.pyplot as plt
```

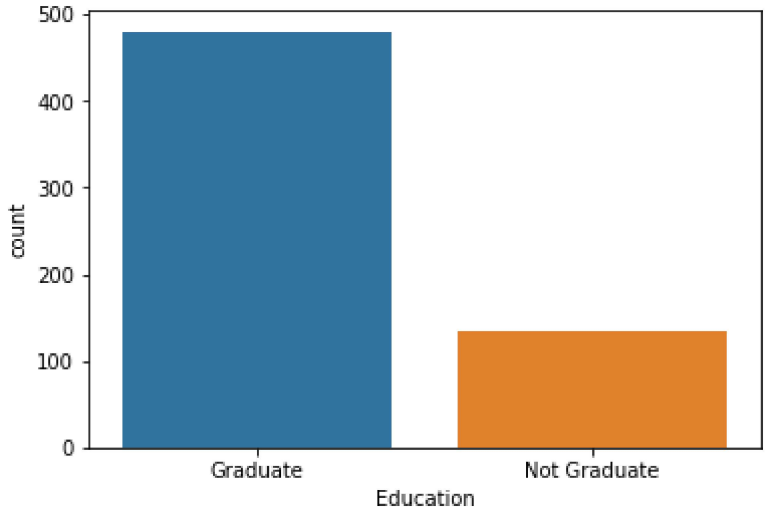
In [23]:
```
sns.countplot(x='Married',data=df)
plt.show()
```



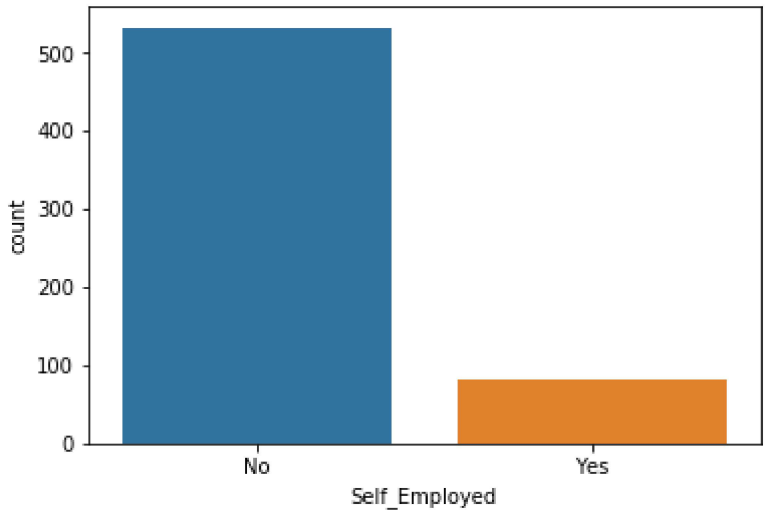
In [14]:
```
sns.countplot(x='Dependents',data=df)
plt.show()
```



In [22]:
```
sns.countplot(x='Education',data=df)
plt.show()
```



In [21]:
```
sns.countplot(x='Self_Employed',data=df)
plt.show()
```



STEP 4:

In [16]:
```
x=df.drop(['Loan_Status'],axis=1)
```

In [17]:
```
y=df.pop('Loan_Status')
```

STEP 5:

In [19]:
```
x=pd.get_dummies(x)
```

STEP 6:

In [20]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=.30,random_state
```

In [34]:
```
from sklearn.preprocessing import StandardScaler
ss=StandardScaler()
```

In [35]:
```
x_train_ss=ss.fit_transform(x_train)
x_train_ss
```

Out[35]:
```
array([[-0.50133384,  0.27865737,  0.40368493, ..., -0.62317695,
        -0.79056942,  1.40682858],
       [-0.42803179,  0.45103751,  0.09632945, ...,  1.60468065,
        -0.79056942, -0.71081865],
       [-0.5669725 ,  0.23208844, -0.15191921, ..., -0.62317695,
         1.26491106, -0.71081865],
       ...,
       [-0.37088951, -0.59751445, -1.38134113, ..., -0.62317695,
        -0.79056942,  1.40682858],
       [ 0.76362634, -0.59751445, -0.00519051, ..., -0.62317695,
         1.26491106, -0.71081865],
       [ 1.36387019, -0.59751445, -0.00519051, ..., -0.62317695,
        -0.79056942,  1.40682858]])
```

In [36]:
```
x_test_ss=ss.fit_transform(x_test)
x_test_ss
```

Out[36]:
```
array([[ 0.60310661, -0.4897835 ,  1.00133607, ..., -0.68429085,
         1.31171195, -0.67579058],
       [-0.1508012 , -0.4897835 , -0.18660311, ..., -0.68429085,
         1.31171195, -0.67579058],
       [-0.17338842, -0.07075971,  0.15280809, ...,  1.4613669 ,
        -0.7623625 , -0.67579058],
       ...,
       [ 1.02547189, -0.4897835 ,  0.50434111, ..., -0.68429085,
        -0.7623625 ,  1.47974835],
       [-0.34587267,  0.20984434, -0.07750665, ...,  1.4613669 ,
        -0.7623625 , -0.67579058],
       [ 0.03716241, -0.4897835 , -0.48964881, ...,  1.4613669 ,
        -0.7623625 , -0.67579058]])
```

In [37]:
```
from sklearn.svm import LinearSVC
lvc=LinearSVC()
lvc.fit(x_train_ss,y_train)
l_pred=lvc.predict(x_test_ss)
l_pred
```

In [63]:
```
from sklearn.metrics import accuracy_score as acs
lvc_acc=acs(y_test,l_pred)
lvc_acc
```

Out[63]:
```
0.745945945945946
```

In [50]:
```
from sklearn.metrics import confusion_matrix as cm
mat=cm(y_test,l_pred)
mat
```

Out[50]:
```
array([[ 20,  45],
       [  2, 118]], dtype=int64)
```

In [52]:
```
from sklearn.metrics import classification_report as cr
cre=cr(y_test,l_pred)
print(cre)
```

```
             precision    recall  f1-score   support

          N       0.91      0.31      0.46        65
          Y       0.72      0.98      0.83       120

avg / total       0.79      0.75      0.70       185
```

STEP 7:

In [62]:
```
from sklearn.linear_model import LogisticRegression
lor=LogisticRegression()
lor.fit(x_train_ss,y_train)
lr_pred=lor.predict(x_test_ss)

from sklearn.svm import LinearSVC
lvc=LinearSVC()
lvc.fit(x_train_ss,y_train)
l_pred=lvc.predict(x_test_ss)

from sklearn.metrics import accuracy_score as acs
lvc_acc=acs(y_test,l_pred)
print("linear accuracy score:",lvc_acc)

lvc_acc=acs(y_test,lr_pred)
print("logistic regression accuracy score:",lvc_acc)
```

```
linear accuracy score: 0.745945945945946
logistic regression accuracy score: 0.7567567567567568
```