In [1]:

```
import matplotlib.pyplot as plt
import pandas as pd
import seaborn as sns
sns.set_style('whitegrid')
%matplotlib inline
import numpy as np
```

In [2]:

```
# Data analysis Project.
# Step1- Read the Loan Prediction Dataset.csv
# https://github.com/sameerCoder/DATA_ANALYST_DATASETS/blob/main/Loan%20Prediction%20Da
taset.csv

url="https://raw.githubusercontent.com/sameerCoder/DATA_ANALYST_DATASETS/main/Loan%20Pr
ediction%20Dataset.csv"
df=pd.read_csv(url)
df
```

Out[2]:

	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
...	...	...	...	...	...	...	...
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 [3]:

```
# Write code to print the first 10 rows of data.
df1=df.head(10)
df1
```

Out[3]:

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome	Coa
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]:

```
# Write code to print count, mean, std, 25% , 50%, 75% and max
df2=df1.describe()
df2
```

Out[4]:

	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History
count	10.000000	10.000000	9.000000	10.0	10.000000
mean	4964.800000	2457.600000	165.777778	360.0	0.900000
std	3079.278047	3270.009147	88.729614	0.0	0.316228
min	2333.000000	0.000000	66.000000	360.0	0.000000
25%	3009.000000	377.000000	120.000000	360.0	1.000000
50%	4294.500000	1521.000000	141.000000	360.0	1.000000
75%	5741.000000	2467.500000	168.000000	360.0	1.000000
max	12841.000000	10968.000000	349.000000	360.0	1.000000

In [5]:

```
# Print all the columns name with there datatype
df1.dtypes
```

Out[5]:

```
Loan_ID               object
Gender                object
Married               object
Dependents            object
Education             object
Self_Employed         object
ApplicantIncome        int64
CoapplicantIncome    float64
LoanAmount           float64
Loan_Amount_Term     float64
Credit_History       float64
Property_Area         object
Loan_Status           object
dtype: object
```

In [6]:

```
# print all columns and number of rows having nan value.
df3 = df[df.isna().any(axis=1)]
df3
```

Out[6]:

	Loan_ID	Gender	Married	Dependents	Education	Self_Employed	ApplicantIncome
0	LP001002	Male	No	0	Graduate	No	5849
11	LP001027	Male	Yes	2	Graduate	NaN	2500
16	LP001034	Male	No	1	Not Graduate	No	3596
19	LP001041	Male	Yes	0	Graduate	NaN	2600
23	LP001050	NaN	Yes	2	Not Graduate	No	3365
...	...	...	...	...	...	...	...
592	LP002933	NaN	No	3+	Graduate	Yes	9357
597	LP002943	Male	No	NaN	Graduate	No	2987
600	LP002949	Female	No	3+	Graduate	NaN	416
601	LP002950	Male	Yes	0	Not Graduate	NaN	2894
605	LP002960	Male	Yes	0	Not Graduate	No	2400

134 rows × 13 columns

In [7]:

```
# create a new column name - NEWCOL1 having data copy of first column of dataset file.
df['NEWCOL1'] = df['Loan_ID']
df
```

Out[7]:

	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
...	...	...	...	...	...	...	...
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 × 14 columns

In [8]:

```
# IN NEWCOL1 replace the row number 10 to 50 with nan value.
df['NEWCOL1'][10:51] = np.nan
df
```

```
E:\SOFTWARES\ANACONDA\lib\site-packages\ipykernel_launcher.py:2: SettingWi
thCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-doc
s/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
```

Out[8]:

	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
...	...	...	...	...	...	...	...
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 × 14 columns

In [9]:

```
df['NEWCOL1'].head(20)
```

Out[9]:

```
0     LP001002
1     LP001003
2     LP001005
3     LP001006
4     LP001008
5     LP001011
6     LP001013
7     LP001014
8     LP001018
9     LP001020
10         NaN
11         NaN
12         NaN
13         NaN
14         NaN
15         NaN
16         NaN
17         NaN
18         NaN
19         NaN
Name: NEWCOL1, dtype: object
```

In [10]:

```
df.isnull().sum()
```

Out[10]:

```
Loan_ID               0
Gender               13
Married               3
Dependents           15
Education             0
Self_Employed        32
ApplicantIncome       0
CoapplicantIncome     0
LoanAmount           22
Loan_Amount_Term     14
Credit_History       50
Property_Area         0
Loan_Status           0
NEWCOL1              41
dtype: int64
```

In [11]:

```
df1=df
```

In [12]:

```
# Fill the nan value of numerical column with there mean.
df['ApplicantIncome'].fillna(df['ApplicantIncome'].mean(),inplace=True)
df['CoapplicantIncome'].fillna(df['CoapplicantIncome'].mean(),inplace=True)
df['LoanAmount'].fillna(df['LoanAmount'].mean(),inplace=True)
df['Loan_Amount_Term'].fillna(df['Loan_Amount_Term'].mean(),inplace=True)
df['Credit_History'].fillna(df['Credit_History'].mean(),inplace=True)
df
```

Out[12]:

	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
...	...	...	...	...	...	...	...
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 × 14 columns

In [13]:

```
# Fill the nan value of non-numerical column with string "DATA MISSING" OR MODE.
df["Gender"].fillna("Data missing", inplace = True)
df["Married"].fillna("Data missing", inplace = True)
df["Dependents"].fillna("Data missing", inplace = True)
df["Self_Employed"].fillna("Data missing", inplace = True)
df["NEWCOL1"].fillna("Data missing", inplace = True)
df
```

Out[13]:

	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
...	...	...	...	...	...	...	...
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 × 14 columns

In [14]:

```
# Check all nan values has been removed or not
df1.isnull().sum()
```

Out[14]:

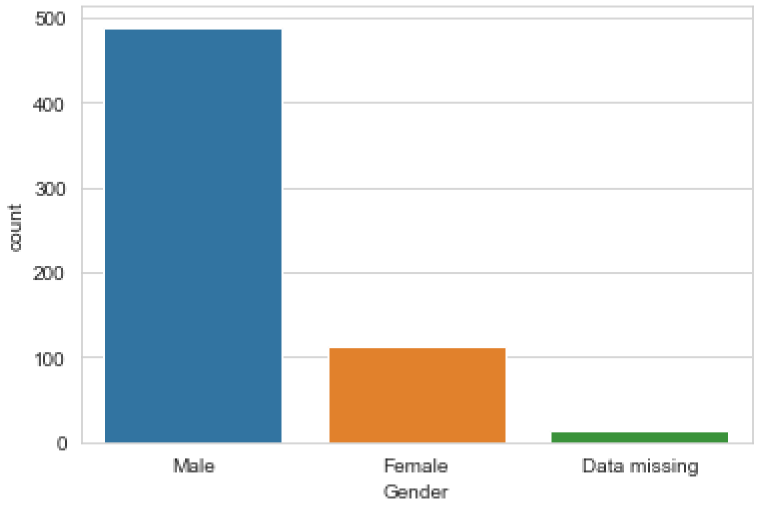
```
Loan_ID              0
Gender               0
Married              0
Dependents           0
Education            0
Self_Employed        0
ApplicantIncome      0
CoapplicantIncome    0
LoanAmount           0
Loan_Amount_Term     0
Credit_History       0
Property_Area        0
Loan_Status          0
NEWCOL1              0
dtype: int64
```

In [15]:

```
# plot countplot of Gender column
sns.countplot('Gender',data=df)
```

Out[15]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1a9e75c8>
```



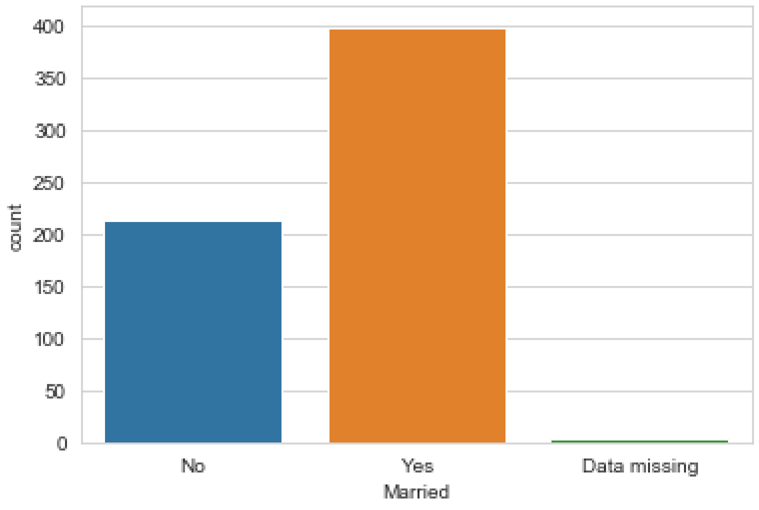
In [16]:

```
# plot - do countplot of Married column
# plot - do countplot of Dependent column
# plot - do countplot of Education column
# plot - do countplot of selfemployed column
# plot - do countplot of Loanstatus column
# plot - do distplot of ApplicantIncome column

sns.countplot('Married',data=df)
```

Out[16]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1b187f88>
```

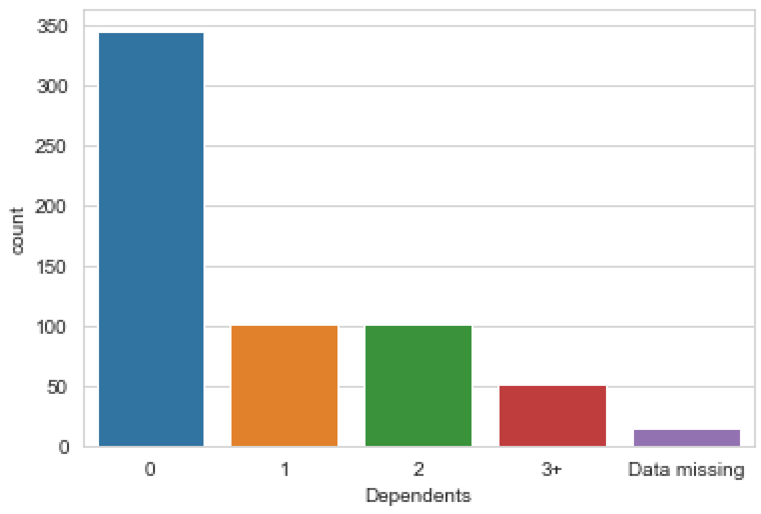


In [17]:

```
sns.countplot('Dependents',data=df)
```

Out[17]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1b1efa48>
```

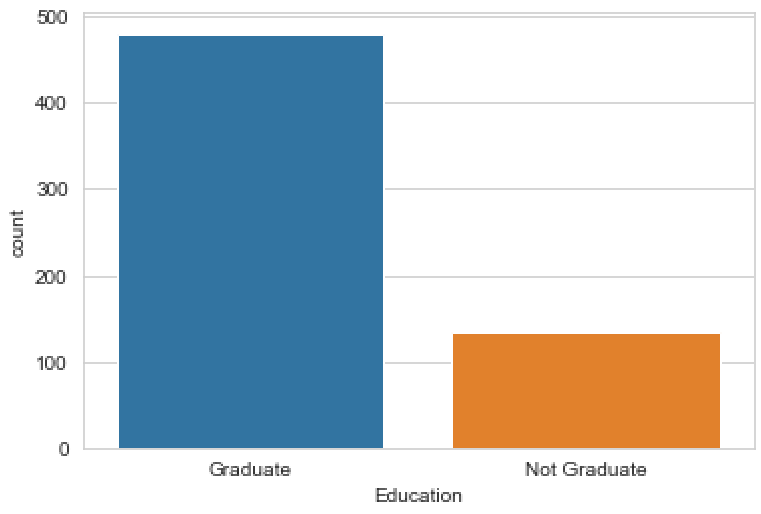


In [18]:

```
sns.countplot('Education',data=df)
```

Out[18]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1b2627c8>
```

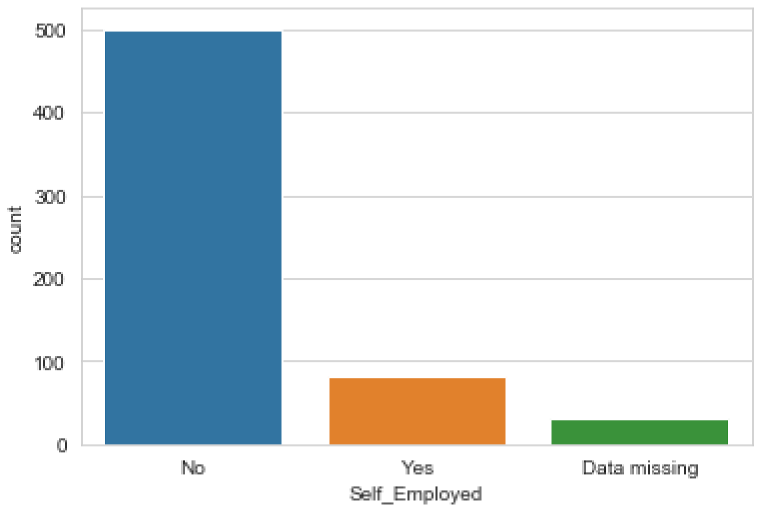


In [19]:

```
sns.countplot('Self_Employed',data=df)
```

Out[19]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1b2b9b08>
```

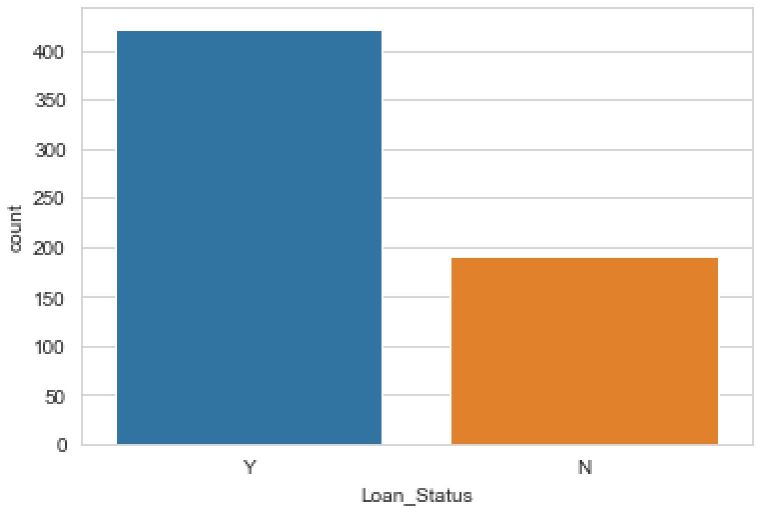


In [20]:

```
sns.countplot('Loan_Status',data=df)
```

Out[20]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1b315248>
```

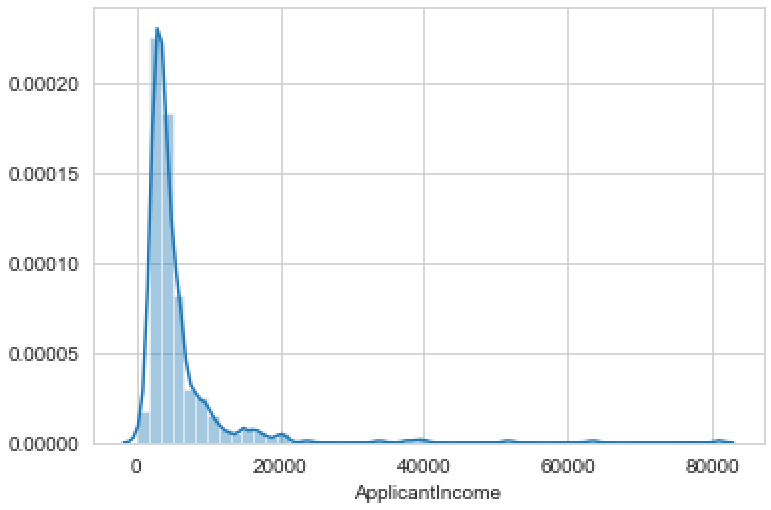


In [21]:

```
#plot - do distplot of ApplicantIncome column
sns.distplot(df['ApplicantIncome'])
```

Out[21]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1b375448>
```



In [22]:

```
# ApplicantIncome column is not appearing good so
# we will do log normalization
# write code to do the log of ApplicantIncome column.

df['lognorm_ApplicantIncome'] = np.log(df['ApplicantIncome'])
df
```

Out[22]:

	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
...	...	...	...	...	...	...	...
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

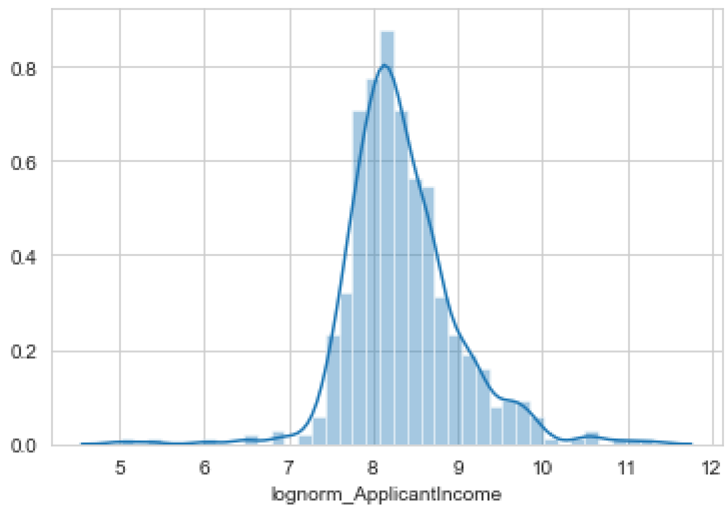
614 rows × 15 columns

In [23]:

```
# now again do distplot of ApplicatnIncome column.
sns.distplot(df['lognorm_ApplicantIncome'])
#By normalising the scale has been changed
```

Out[23]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1b3b0148>
```

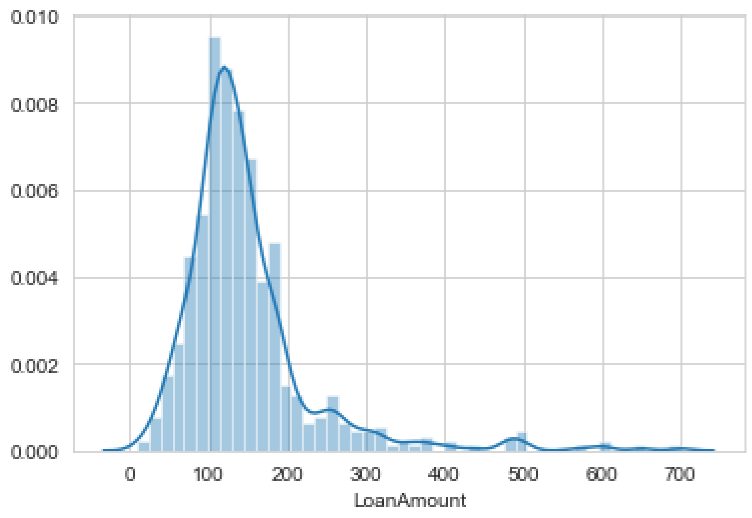


In [24]:

```
# Distplot LoanAmount
sns.distplot(df['LoanAmount'])
```

Out[24]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1b4c5788>
```



In [25]:

```
# log the LoanAmount
df['lognorm_LoanAmount'] = np.log(df['LoanAmount'])
df
```

Out[25]:

	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
...	...	...	...	...	...	...	...
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

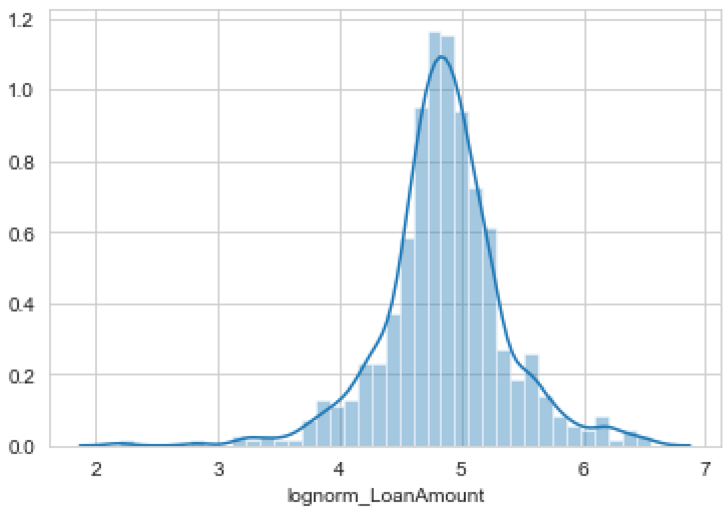
614 rows × 16 columns

In [26]:

```
# Distplot LoanAmount
sns.distplot(df['lognorm_LoanAmount'])
```

Out[26]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1b548d88>
```

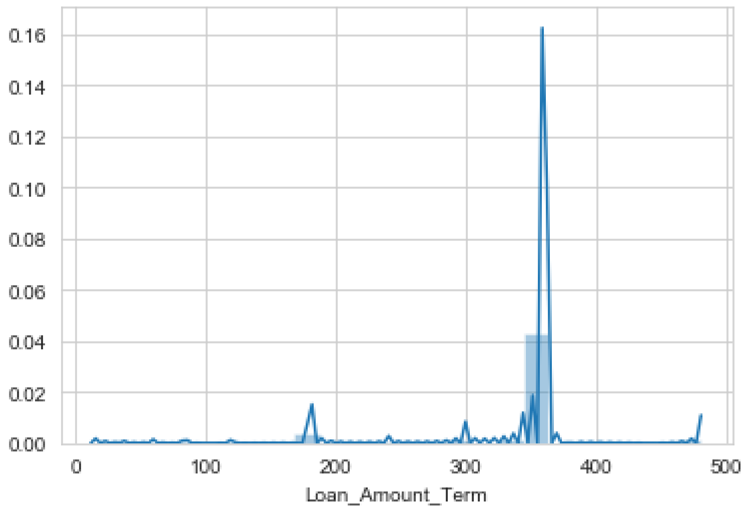


In [27]:

```
# Distplot Loan_Amount_Term
sns.distplot(df['Loan_Amount_Term'], kde_kws={'bw': 0})
```

Out[27]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1b6e3a08>
```



In [28]:

```
# log the Loan_Amount_Term

df['lognorm_Loan_Amount_Term'] = np.log(df['Loan_Amount_Term'])
df
```

Out[28]:

	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
...	...	...	...	...	...	...	...
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

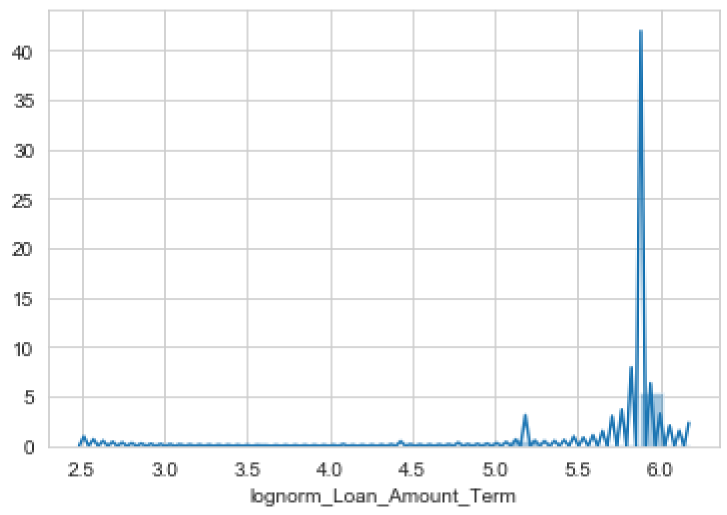
614 rows × 17 columns

In [29]:

```
# Distplot Loan_Amount_Term
sns.distplot(df['lognorm_Loan_Amount_Term'],kde_kws={'bw':0})
```

Out[29]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1b78ae08>
```



In [35]:

```
# Create new Total_Income column= ApplicantIncome , CoapplicantIncome
df['Total_Income'] = df['ApplicantIncome']+ df['CoapplicantIncome']
df
```

Out[35]:

	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
...	...	...	...	...	...	...	...
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 × 18 columns

In [41]:

```
# Create ApplicantIncomeLog column = value log of ApplicantIncome
df['ApplicantIncomeLog']=df['lognorm_ApplicantIncome']
# Create CoaplicantIncomeLog column = value log of CoaplicantIncome
df['CoapplicantIncomeLog']= np.log(df['CoapplicantIncome'])
df
```

```
E:\SOFTWARES\ANACONDA\lib\site-packages\pandas\core\series.py:679: Runtime
Warning: divide by zero encountered in log
  result = getattr(ufunc, method)(*inputs, **kwargs)
```

Out[41]:

	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
...	...	...	...	...	...	...	...
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

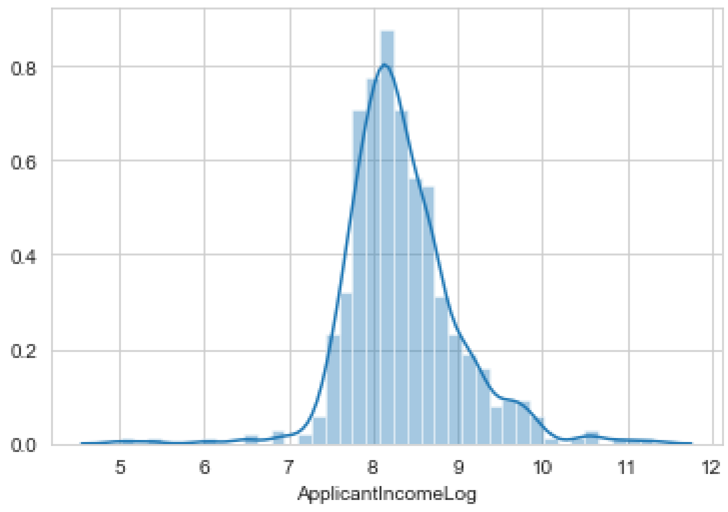
614 rows × 21 columns

In [38]:

```
# plot displot of ApplicationIncomeLog
# plot displot of CoapplicantIncomeLog
sns.distplot(df['ApplicantIncomeLog'])
```

Out[38]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x20c1baf99c8>
```



In [ ]:

```

```

In [ ]:

```

```