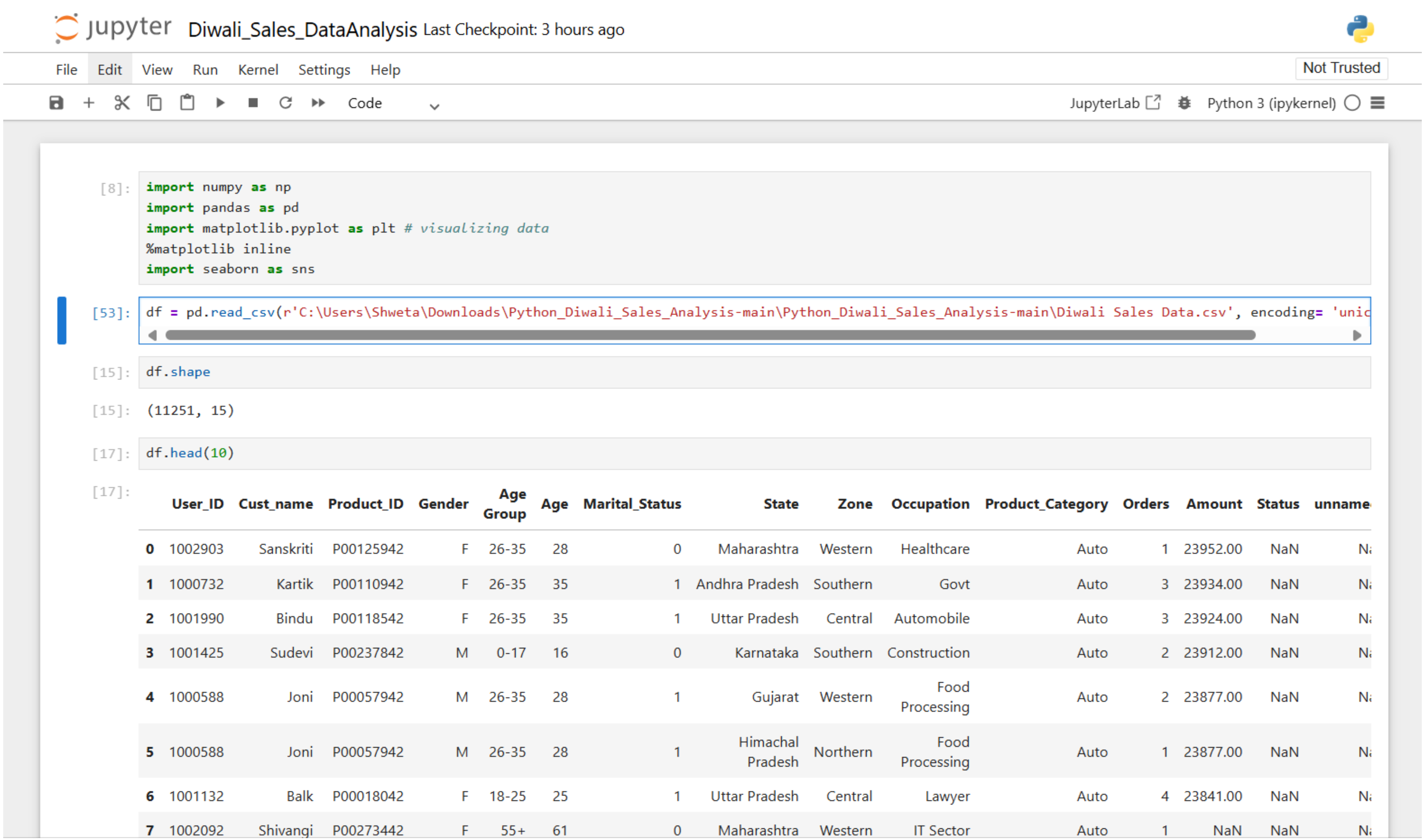
Exploratory Data Analysis (EDA)

Extract insights using visual and statistical exploration.



```
[8]: import numpy as np
     import pandas as pd
     import matplotlib.pyplot as plt # visualizing data
     %matplotlib inline
     import seaborn as sns
```

```
[53]: df = pd.read_csv(r'C:\Users\Shweta\Downloads\Python_Diwali_Sales_Analysis-main\Python_Diwali_Sales_Analysis-main\Diwali Sales Data.csv', encoding= 'unic
```

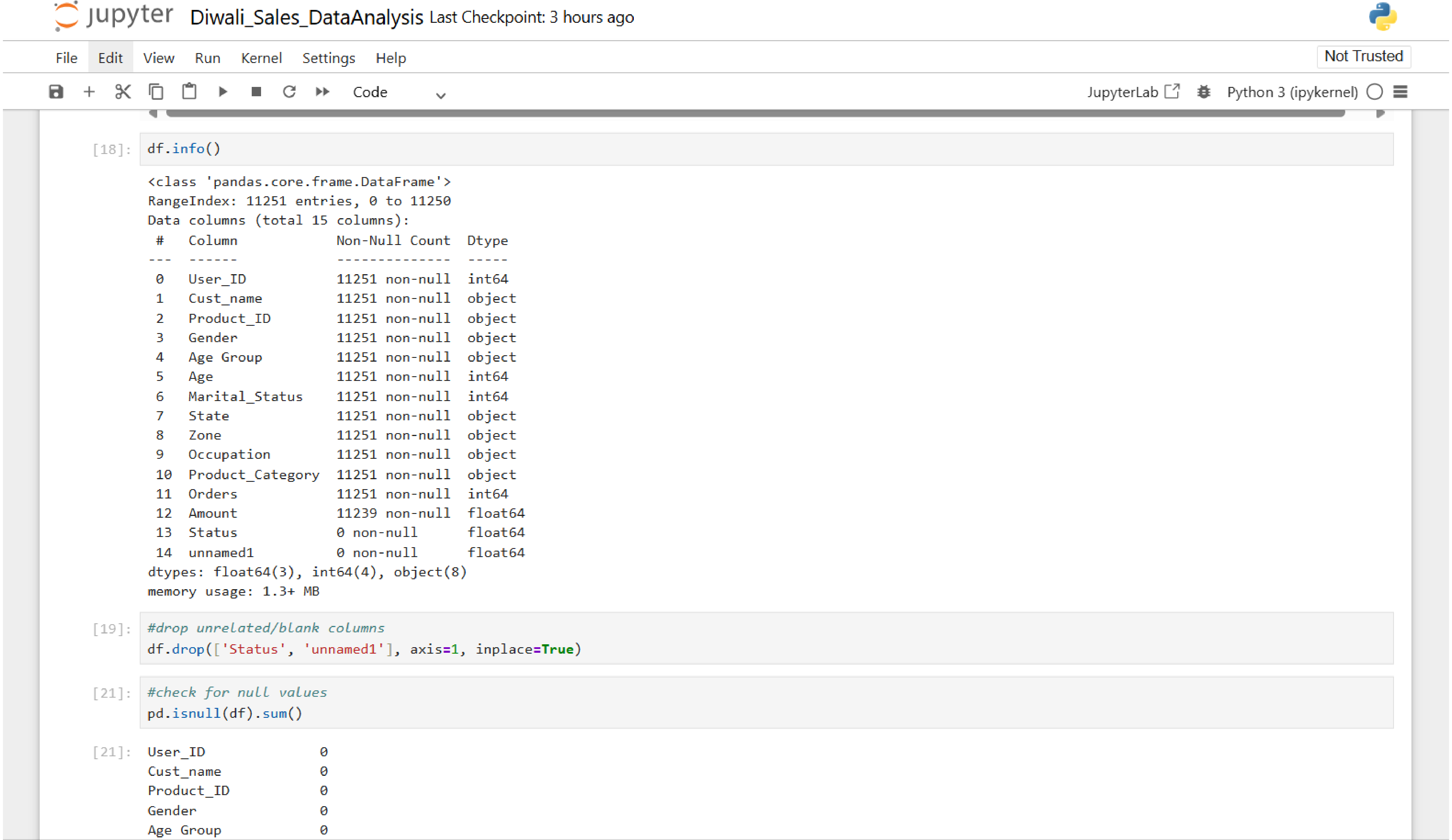
```
[15]: df.shape
```

```
[15]: (11251, 15)
```

```
[17]: df.head(10)
```

[17]:

	User_ID	Cust_name	Product_ID	Gender	Age Group	Age	Marital_Status	State	Zone	Occupation	Product_Category	Orders	Amount	Status	unname
0	1002903	Sanskriti	P00125942	F	26-35	28	0	Maharashtra	Western	Healthcare	Auto	1	23952.00	NaN	Na
1	1000732	Kartik	P00110942	F	26-35	35	1	Andhra Pradesh	Southern	Govt	Auto	3	23934.00	NaN	Na
2	1001990	Bindu	P00118542	F	26-35	35	1	Uttar Pradesh	Central	Automobile	Auto	3	23924.00	NaN	Na
3	1001425	Sudevi	P00237842	M	0-17	16	0	Karnataka	Southern	Construction	Auto	2	23912.00	NaN	Na
4	1000588	Joni	P00057942	M	26-35	28	1	Gujarat	Western	Food Processing	Auto	2	23877.00	NaN	Na
5	1000588	Joni	P00057942	M	26-35	28	1	Himachal Pradesh	Northern	Food Processing	Auto	1	23877.00	NaN	Na
6	1001132	Balk	P00018042	F	18-25	25	1	Uttar Pradesh	Central	Lawyer	Auto	4	23841.00	NaN	Na
7	1002092	Shivangi	P00273442	F	55+	61	0	Maharashtra	Western	IT Sector	Auto	1	NaN	NaN	Na



[18]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11251 entries, 0 to 11250
Data columns (total 15 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   User_ID           11251 non-null  int64  
 1   Cust_name         11251 non-null  object 
 2   Product_ID        11251 non-null  object 
 3   Gender            11251 non-null  object 
 4   Age Group         11251 non-null  object 
 5   Age               11251 non-null  int64  
 6   Marital_Status    11251 non-null  int64  
 7   State             11251 non-null  object 
 8   Zone              11251 non-null  object 
 9   Occupation        11251 non-null  object 
 10  Product_Category  11251 non-null  object 
 11  Orders            11251 non-null  int64  
 12  Amount            11239 non-null  float64
 13  Status            0 non-null      float64
 14  unnamed1          0 non-null      float64
dtypes: float64(3), int64(4), object(8)
memory usage: 1.3+ MB
```

[19]:

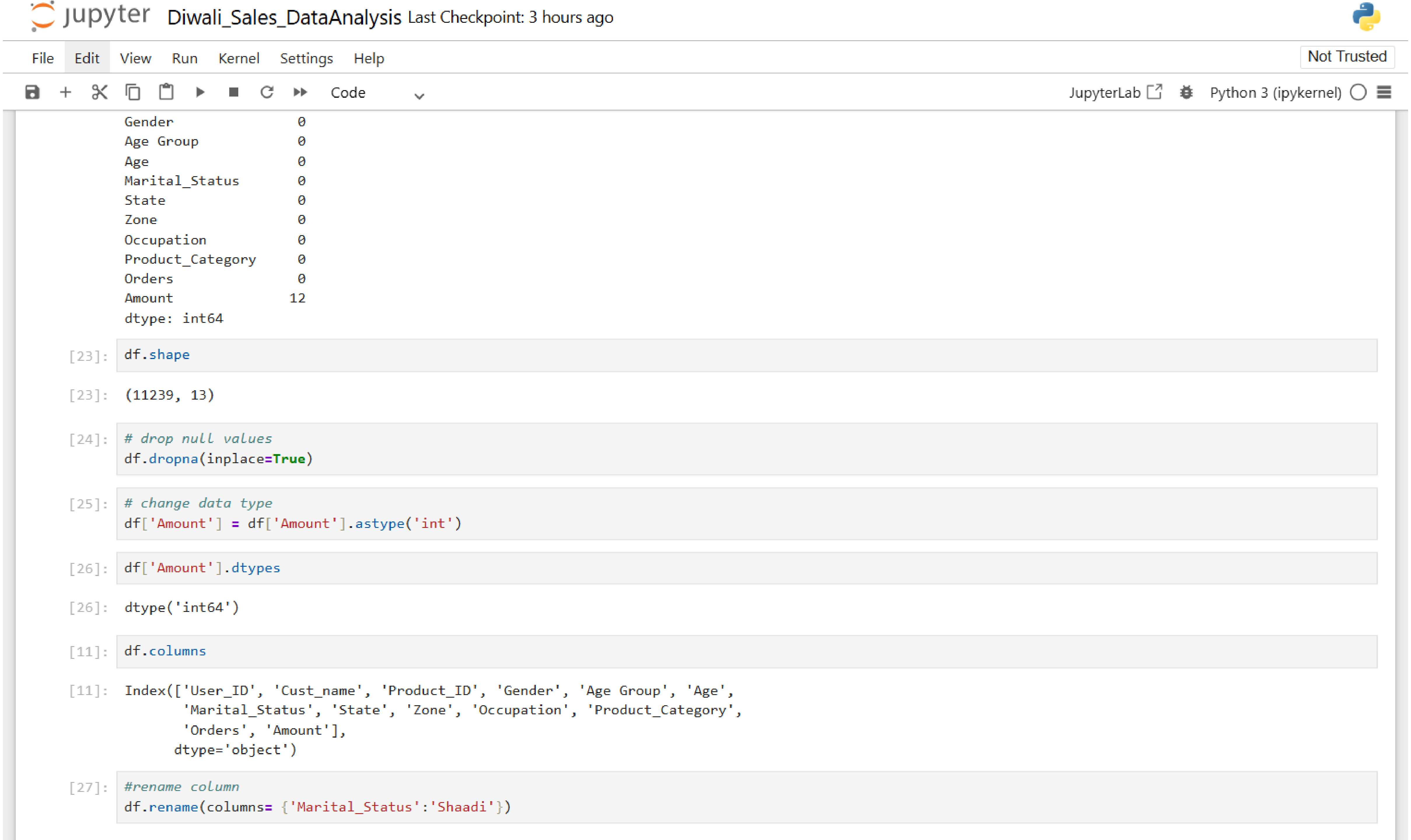
```
#drop unrelated/blank columns
df.drop(['Status', 'unnamed1'], axis=1, inplace=True)
```

[21]:

```
#check for null values
pd.isnull(df).sum()
```

[21]:

```
User_ID              0
Cust_name            0
Product_ID           0
Gender               0
Age Group            0
```



```
Gender              0
Age Group           0
Age                 0
Marital_Status      0
State               0
Zone                0
Occupation          0
Product_Category    0
Orders              0
Amount             12
dtype: int64
```

```
[23]: df.shape
```

```
[23]: (11239, 13)
```

```
[24]: # drop null values
      df.dropna(inplace=True)
```

```
[25]: # change data type
      df['Amount'] = df['Amount'].astype('int')
```

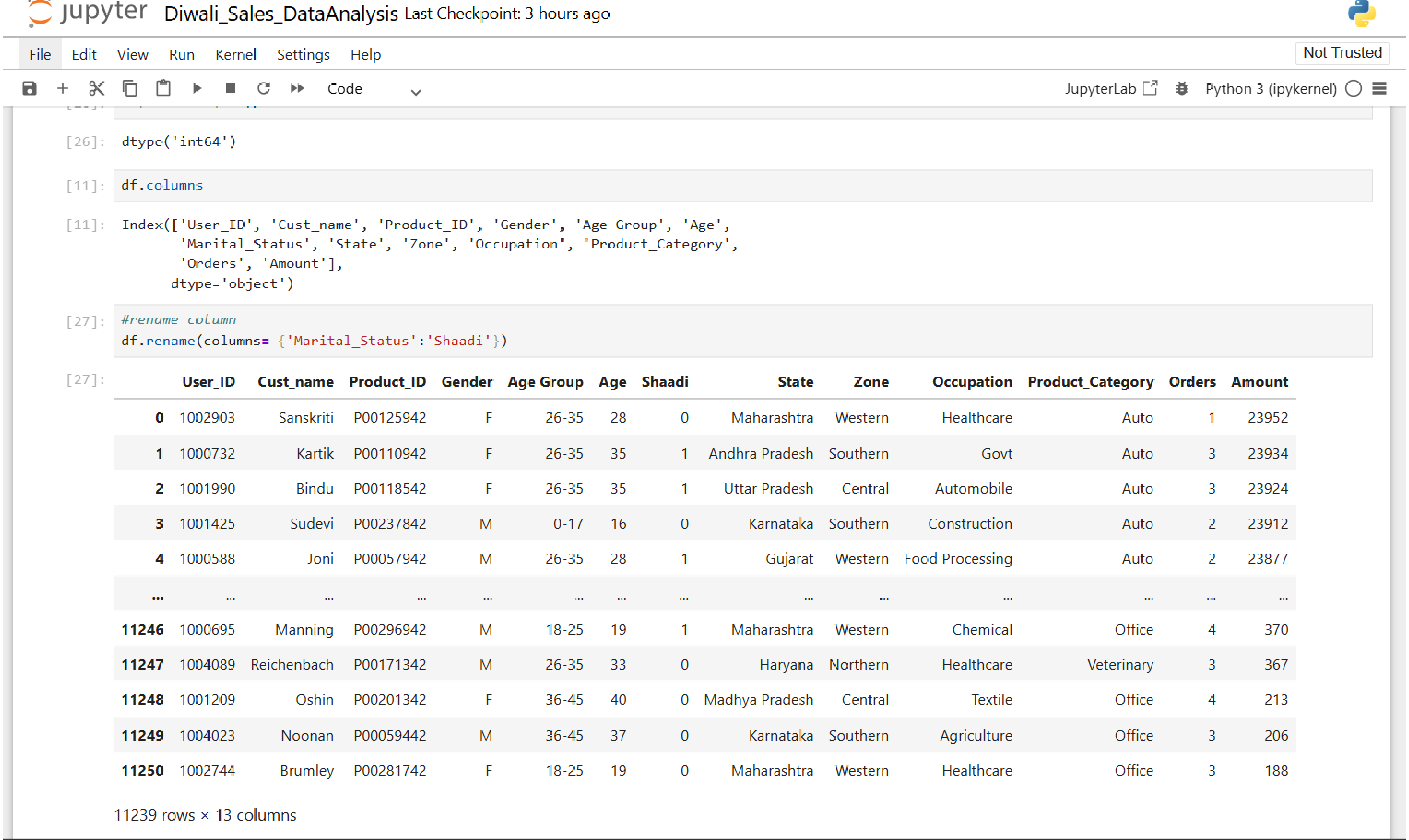
```
[26]: df['Amount'].dtypes
```

```
[26]: dtype('int64')
```

```
[11]: df.columns
```

```
[11]: Index(['User_ID', 'Cust_name', 'Product_ID', 'Gender', 'Age Group', 'Age',
             'Marital_Status', 'State', 'Zone', 'Occupation', 'Product_Category',
             'Orders', 'Amount'],
            dtype='object')
```

```
[27]: #rename column
      df.rename(columns= {'Marital_Status':'Shaadi'})
```



```
[26]: dtype('int64')
```

```
[11]: df.columns
```

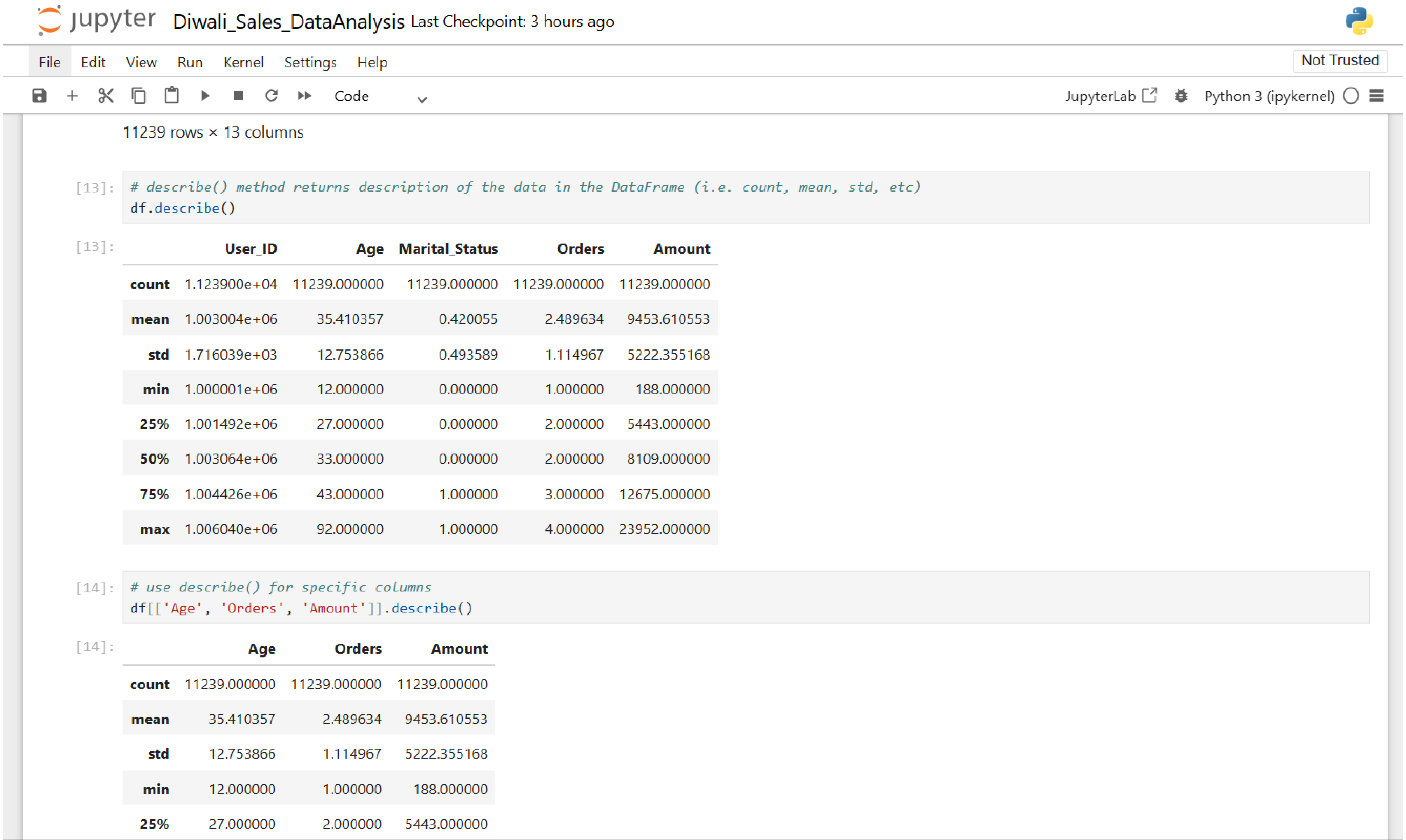
```
[11]: Index(['User_ID', 'Cust_name', 'Product_ID', 'Gender', 'Age Group', 'Age',
             'Marital_Status', 'State', 'Zone', 'Occupation', 'Product_Category',
             'Orders', 'Amount'],
            dtype='object')
```

```
[27]: #rename column
      df.rename(columns= {'Marital_Status':'Shaadi'})
```

[27]:

	User_ID	Cust_name	Product_ID	Gender	Age Group	Age	Shaadi	State	Zone	Occupation	Product_Category	Orders	Amount
0	1002903	Sanskriti	P00125942	F	26-35	28	0	Maharashtra	Western	Healthcare	Auto	1	23952
1	1000732	Kartik	P00110942	F	26-35	35	1	Andhra Pradesh	Southern	Govt	Auto	3	23934
2	1001990	Bindu	P00118542	F	26-35	35	1	Uttar Pradesh	Central	Automobile	Auto	3	23924
3	1001425	Sudevi	P00237842	M	0-17	16	0	Karnataka	Southern	Construction	Auto	2	23912
4	1000588	Joni	P00057942	M	26-35	28	1	Gujarat	Western	Food Processing	Auto	2	23877
...	...	...	...	...	...	...	...	...	...	...	...	...	...
11246	1000695	Manning	P00296942	M	18-25	19	1	Maharashtra	Western	Chemical	Office	4	370
11247	1004089	Reichenbach	P00171342	M	26-35	33	0	Haryana	Northern	Healthcare	Veterinary	3	367
11248	1001209	Oshin	P00201342	F	36-45	40	0	Madhya Pradesh	Central	Textile	Office	4	213
11249	1004023	Noonan	P00059442	M	36-45	37	0	Karnataka	Southern	Agriculture	Office	3	206
11250	1002744	Brumley	P00281742	F	18-25	19	0	Maharashtra	Western	Healthcare	Office	3	188

11239 rows × 13 columns



11239 rows × 13 columns

[13]:
```
# describe() method returns description of the data in the DataFrame (i.e. count, mean, std, etc)
df.describe()
```

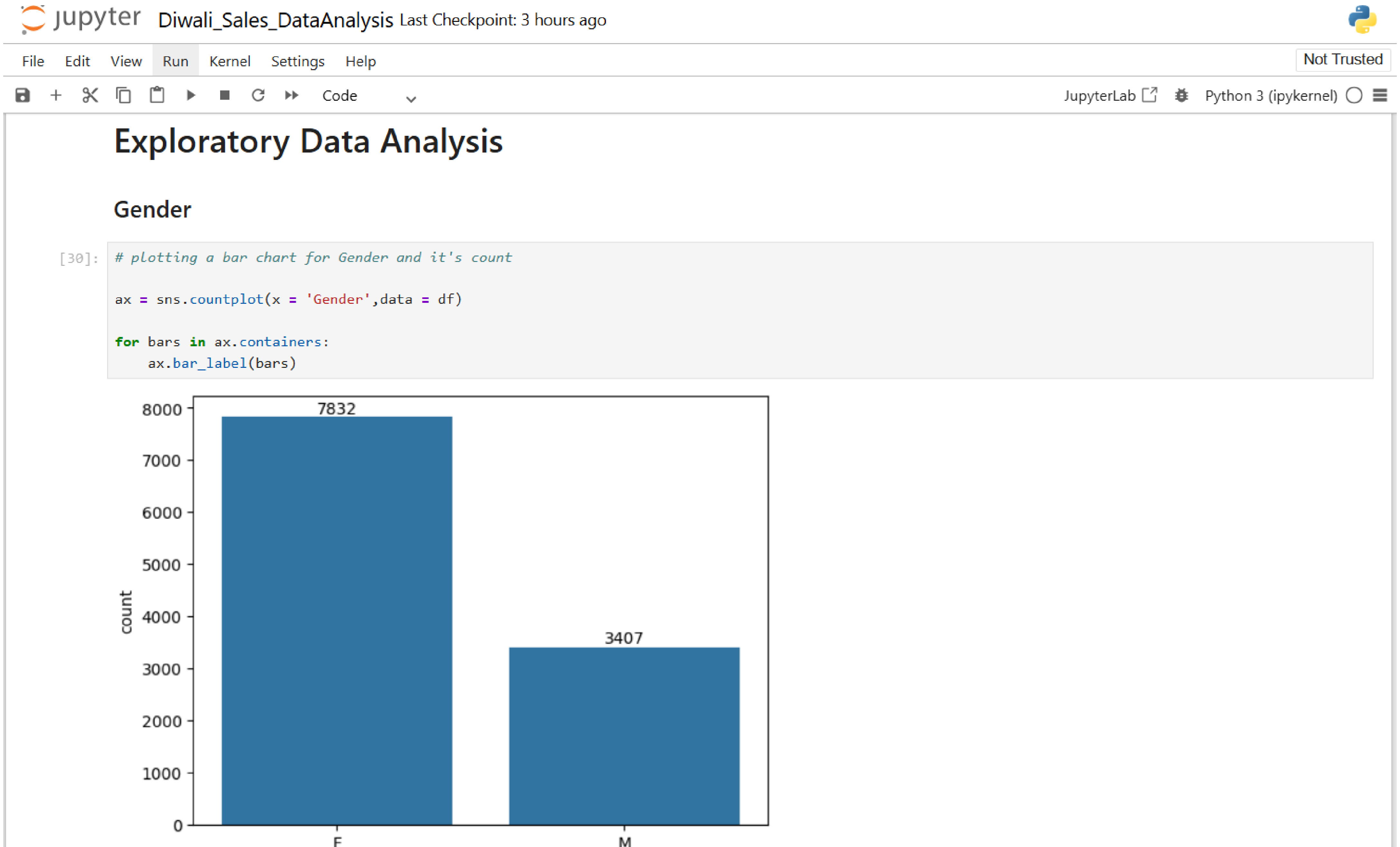
[13]:

	User_ID	Age	Marital_Status	Orders	Amount
count	1.123900e+04	11239.000000	11239.000000	11239.000000	11239.000000
mean	1.003004e+06	35.410357	0.420055	2.489634	9453.610553
std	1.716039e+03	12.753866	0.493589	1.114967	5222.355168
min	1.000001e+06	12.000000	0.000000	1.000000	188.000000
25%	1.001492e+06	27.000000	0.000000	2.000000	5443.000000
50%	1.003064e+06	33.000000	0.000000	2.000000	8109.000000
75%	1.004426e+06	43.000000	1.000000	3.000000	12675.000000
max	1.006040e+06	92.000000	1.000000	4.000000	23952.000000

[14]:
```
# use describe() for specific columns
df[['Age', 'Orders', 'Amount']].describe()
```

[14]:

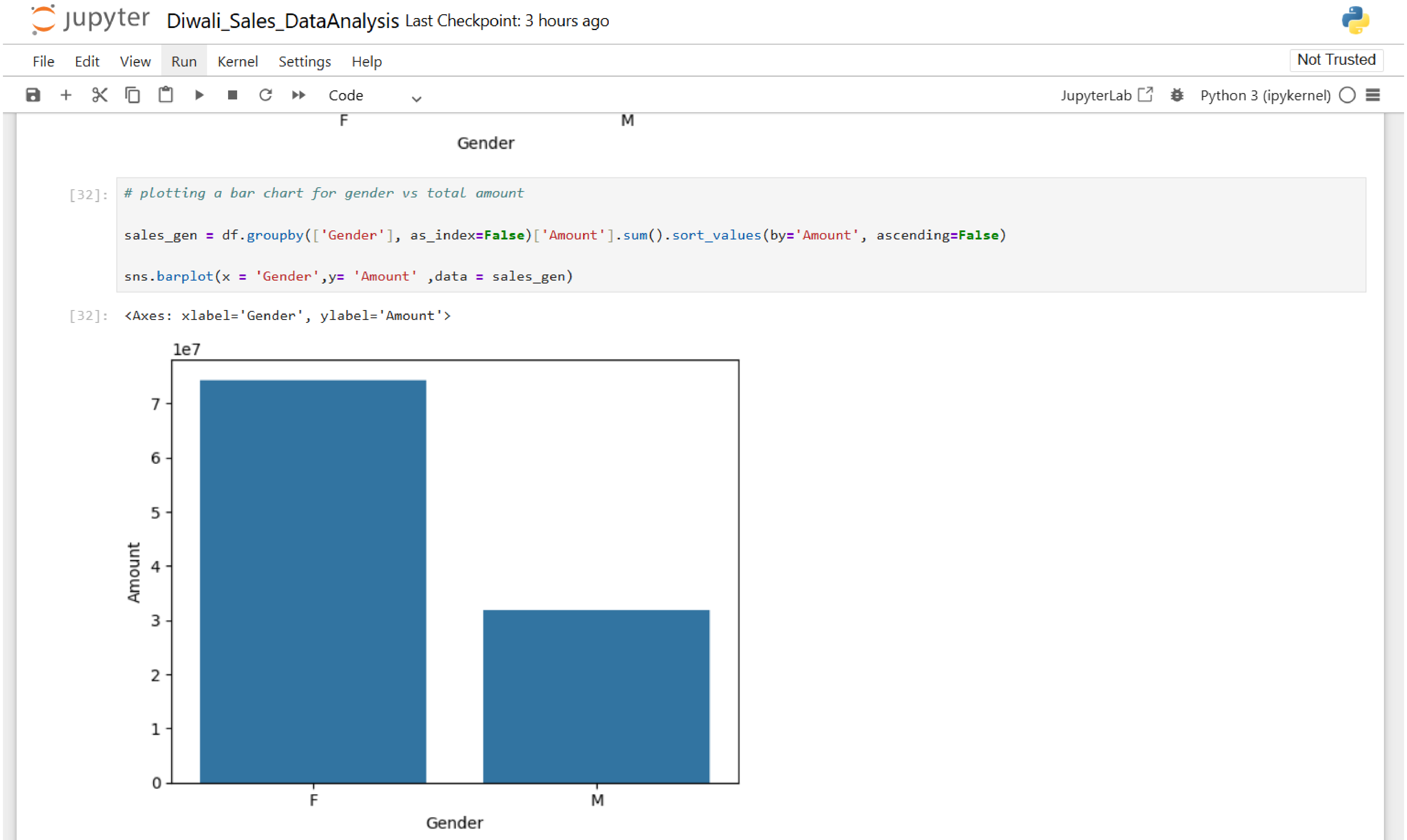
	Age	Orders	Amount
count	11239.000000	11239.000000	11239.000000
mean	35.410357	2.489634	9453.610553
std	12.753866	1.114967	5222.355168
min	12.000000	1.000000	188.000000
25%	27.000000	2.000000	5443.000000



Exploratory Data Analysis

Gender

```
[30]: # plotting a bar chart for Gender and it's count

ax = sns.countplot(x = 'Gender',data = df)

for bars in ax.containers:
    ax.bar_label(bars)
```

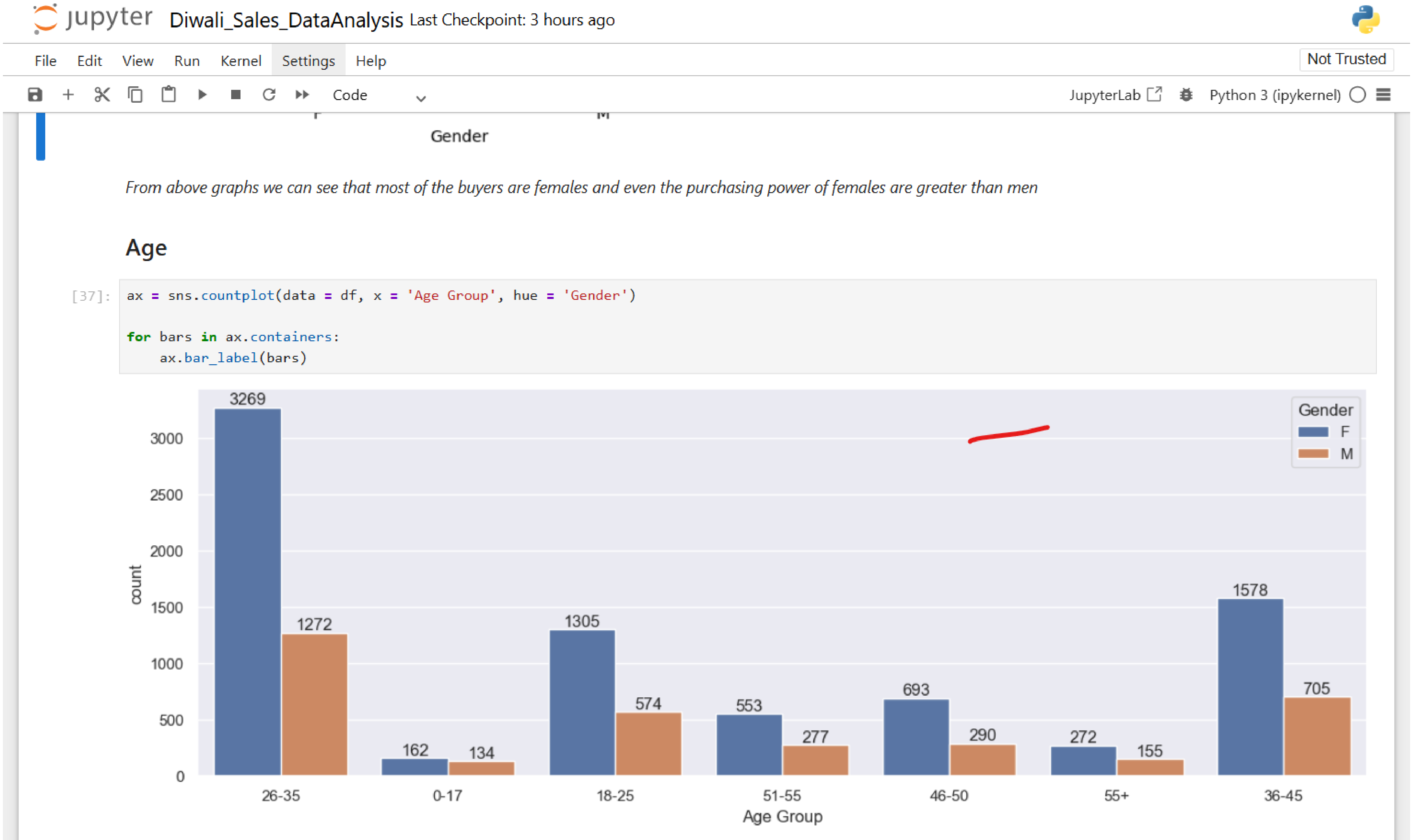


[32]:

```
# plotting a bar chart for gender vs total amount

sales_gen = df.groupby(['Gender'], as_index=False)['Amount'].sum().sort_values(by='Amount', ascending=False)

sns.barplot(x = 'Gender',y= 'Amount' ,data = sales_gen)
```

[32]:

```
<Axes: xlabel='Gender', ylabel='Amount'>
```

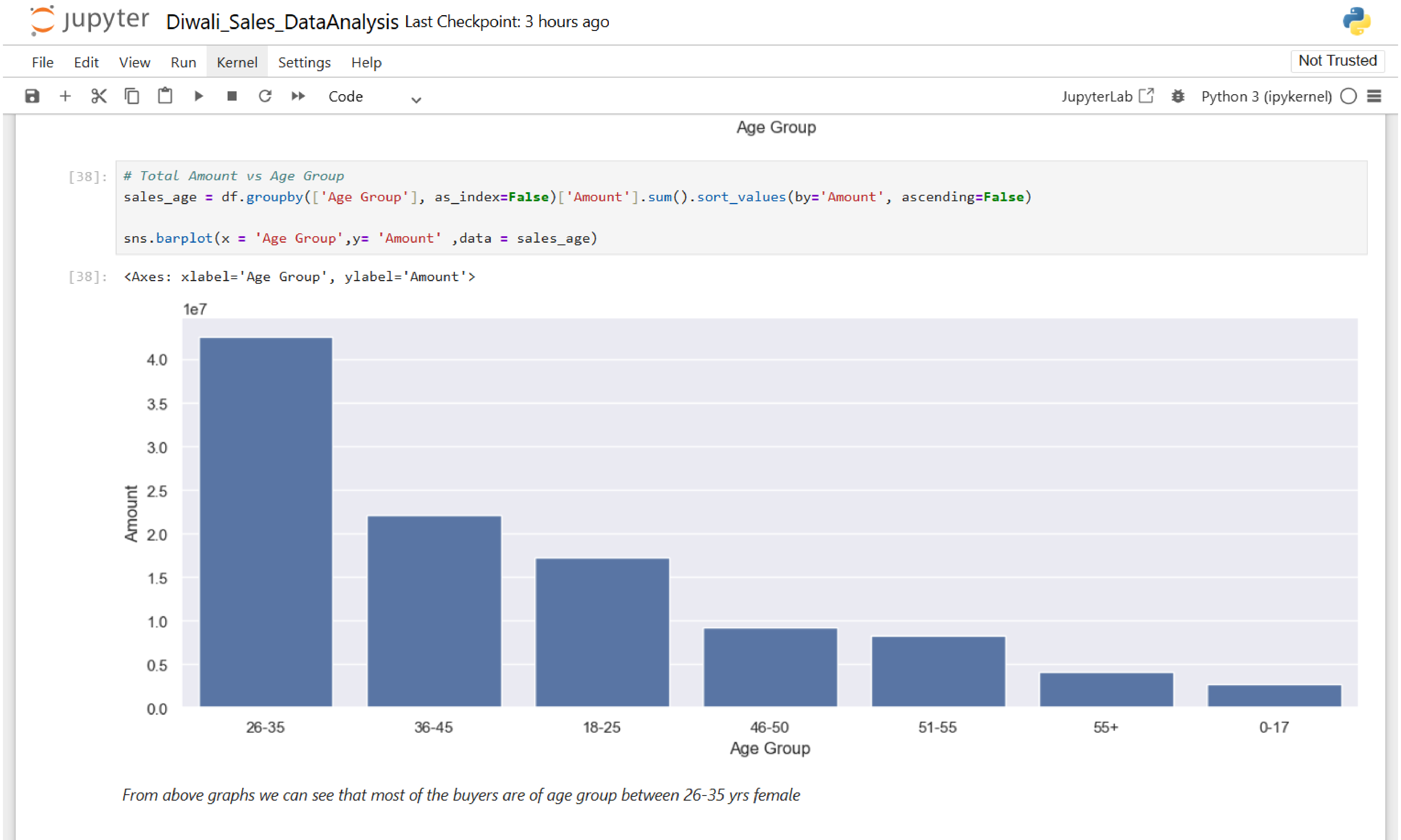


From above graphs we can see that most of the buyers are females and even the purchasing power of females are greater than men

Age

[37]:

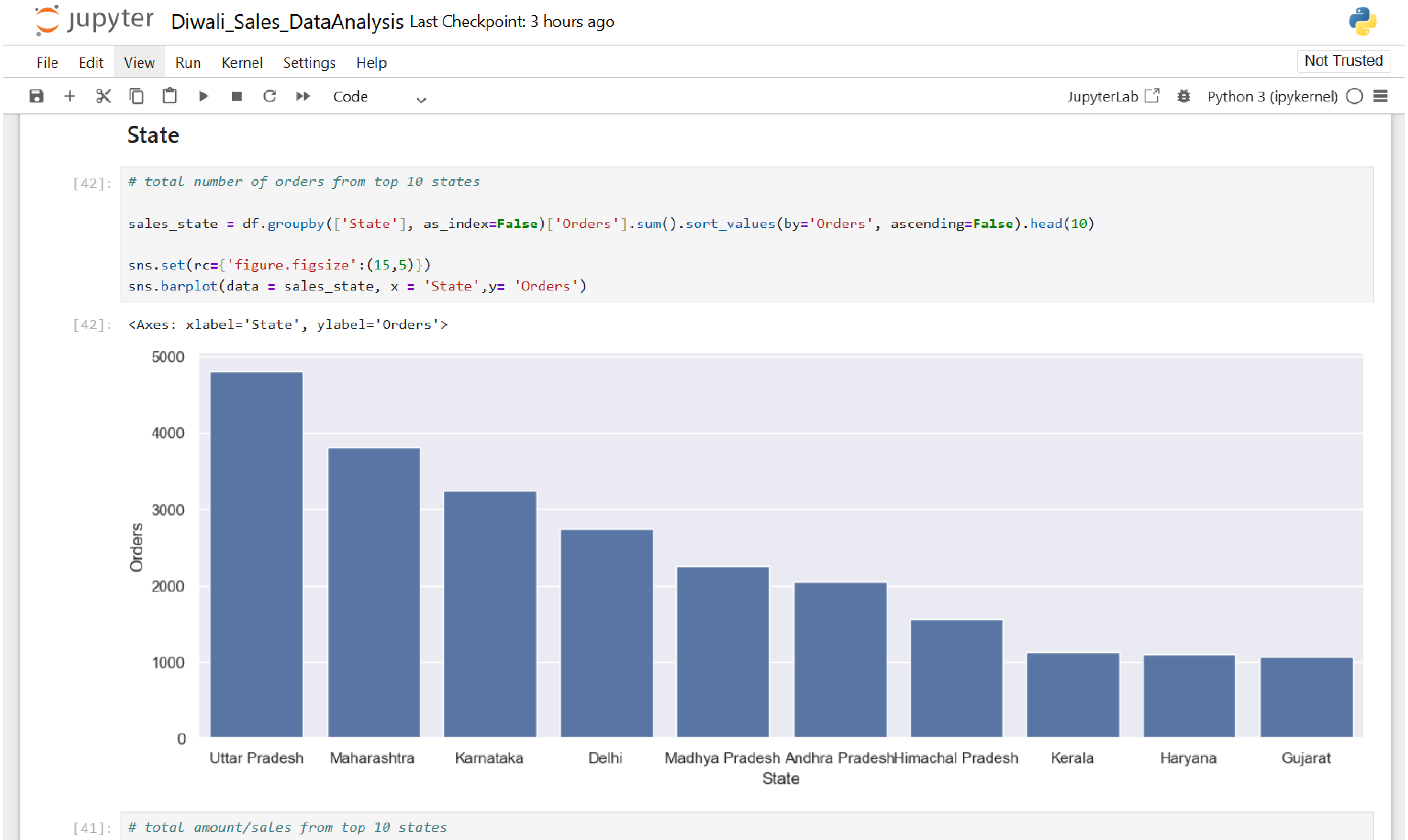
```
ax = sns.countplot(data = df, x = 'Age Group', hue = 'Gender')

for bars in ax.containers:
    ax.bar_label(bars)
```



```
[38]: # Total Amount vs Age Group
      sales_age = df.groupby(['Age Group'], as_index=False)['Amount'].sum().sort_values(by='Amount', ascending=False)

      sns.barplot(x = 'Age Group',y= 'Amount' ,data = sales_age)
```

```
[38]: <Axes: xlabel='Age Group', ylabel='Amount'>
```

From above graphs we can see that most of the buyers are of age group between 26-35 yrs female



State

[42]:

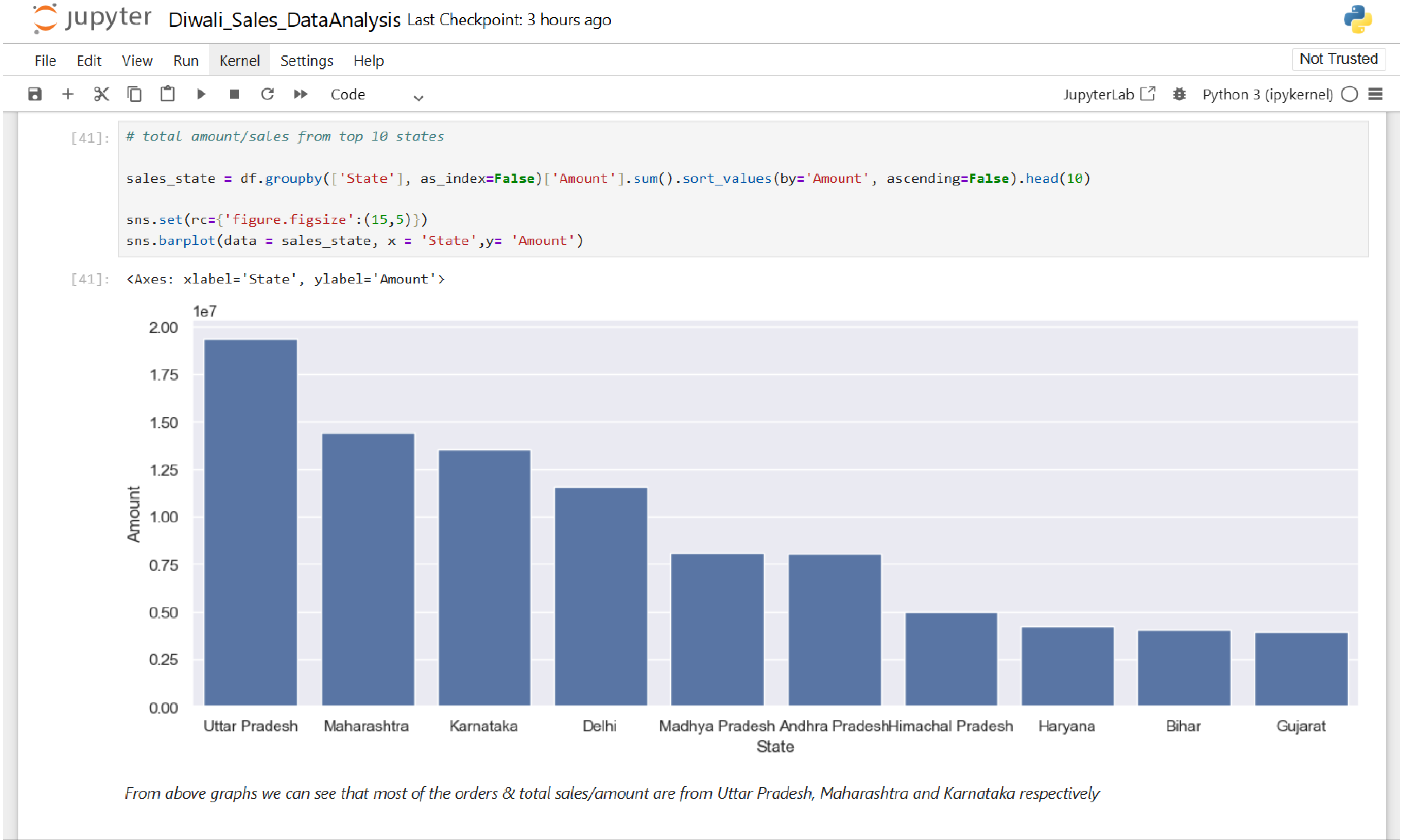
```
# total number of orders from top 10 states

sales_state = df.groupby(['State'], as_index=False)['Orders'].sum().sort_values(by='Orders', ascending=False).head(10)

sns.set(rc={'figure.figsize':(15,5)})
sns.barplot(data = sales_state, x = 'State',y= 'Orders')
```

[42]:

```
<Axes: xlabel='State', ylabel='Orders'>
```

[41]:

```
# total amount/sales from top 10 states
```



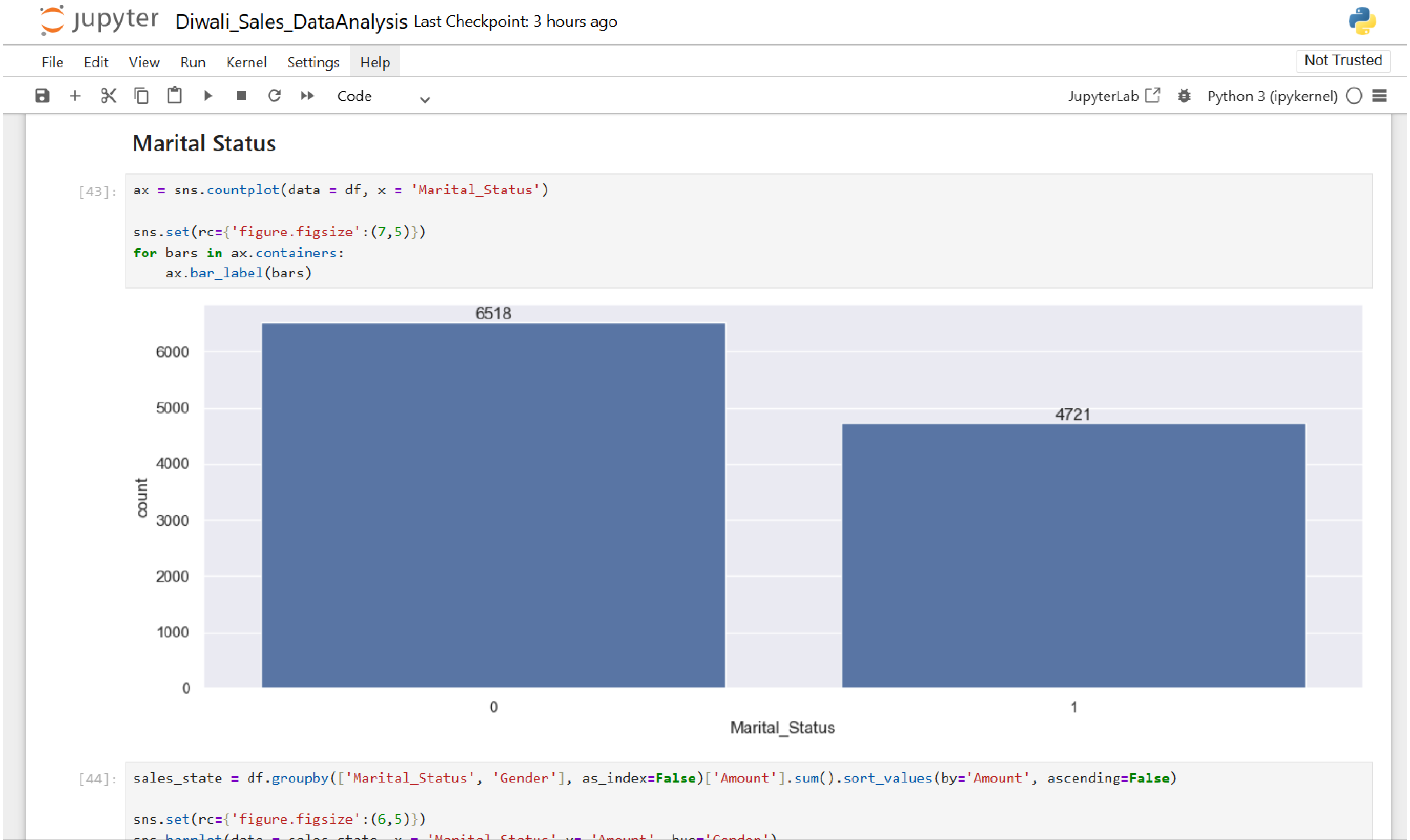
[41]:

```
# total amount/sales from top 10 states

sales_state = df.groupby(['State'], as_index=False)['Amount'].sum().sort_values(by='Amount', ascending=False).head(10)

sns.set(rc={'figure.figsize':(15,5)})
sns.barplot(data = sales_state, x = 'State',y= 'Amount')
```

[41]:

```
<Axes: xlabel='State', ylabel='Amount'>
```

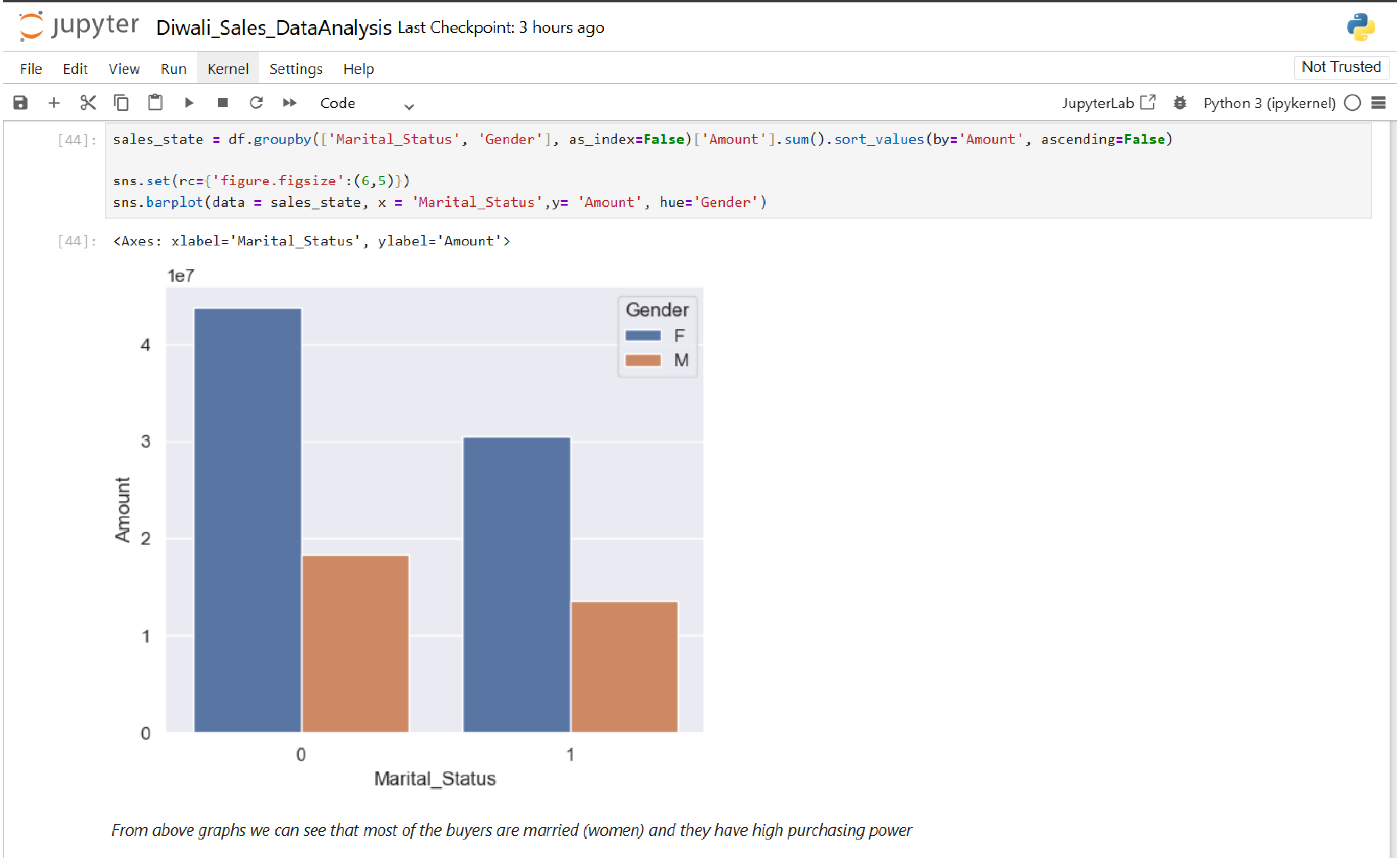
From above graphs we can see that most of the orders & total sales/amount are from Uttar Pradesh, Maharashtra and Karnataka respectively



Marital Status

[43]:
```
ax = sns.countplot(data = df, x = 'Marital_Status')

sns.set(rc={'figure.figsize':(7,5)})
for bars in ax.containers:
    ax.bar_label(bars)
```

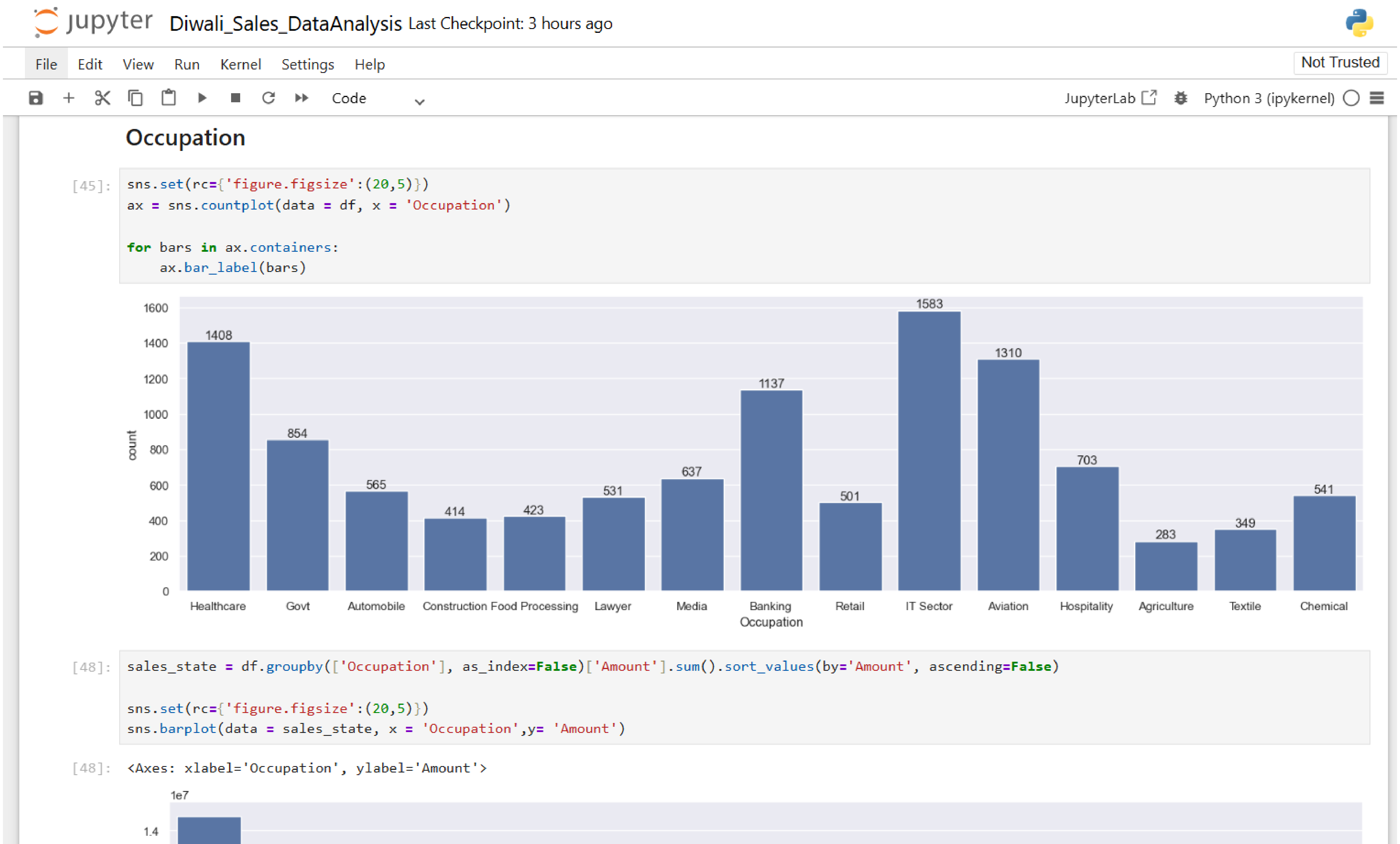
[44]:
```
sales_state = df.groupby(['Marital_Status', 'Gender'], as_index=False)['Amount'].sum().sort_values(by='Amount', ascending=False)

sns.set(rc={'figure.figsize':(6,5)})
sns.barplot(data = sales_state, x = 'Marital_Status',y= 'Amount', hue='Gender')
```



```
sales_state = df.groupby(['Marital_Status', 'Gender'], as_index=False)['Amount'].sum().sort_values(by='Amount', ascending=False)

sns.set(rc={'figure.figsize':(6,5)})
sns.barplot(data = sales_state, x = 'Marital_Status',y= 'Amount', hue='Gender')
```

```
<Axes: xlabel='Marital_Status', ylabel='Amount'>
```

From above graphs we can see that most of the buyers are married (women) and they have high purchasing power



Occupation

[45]:

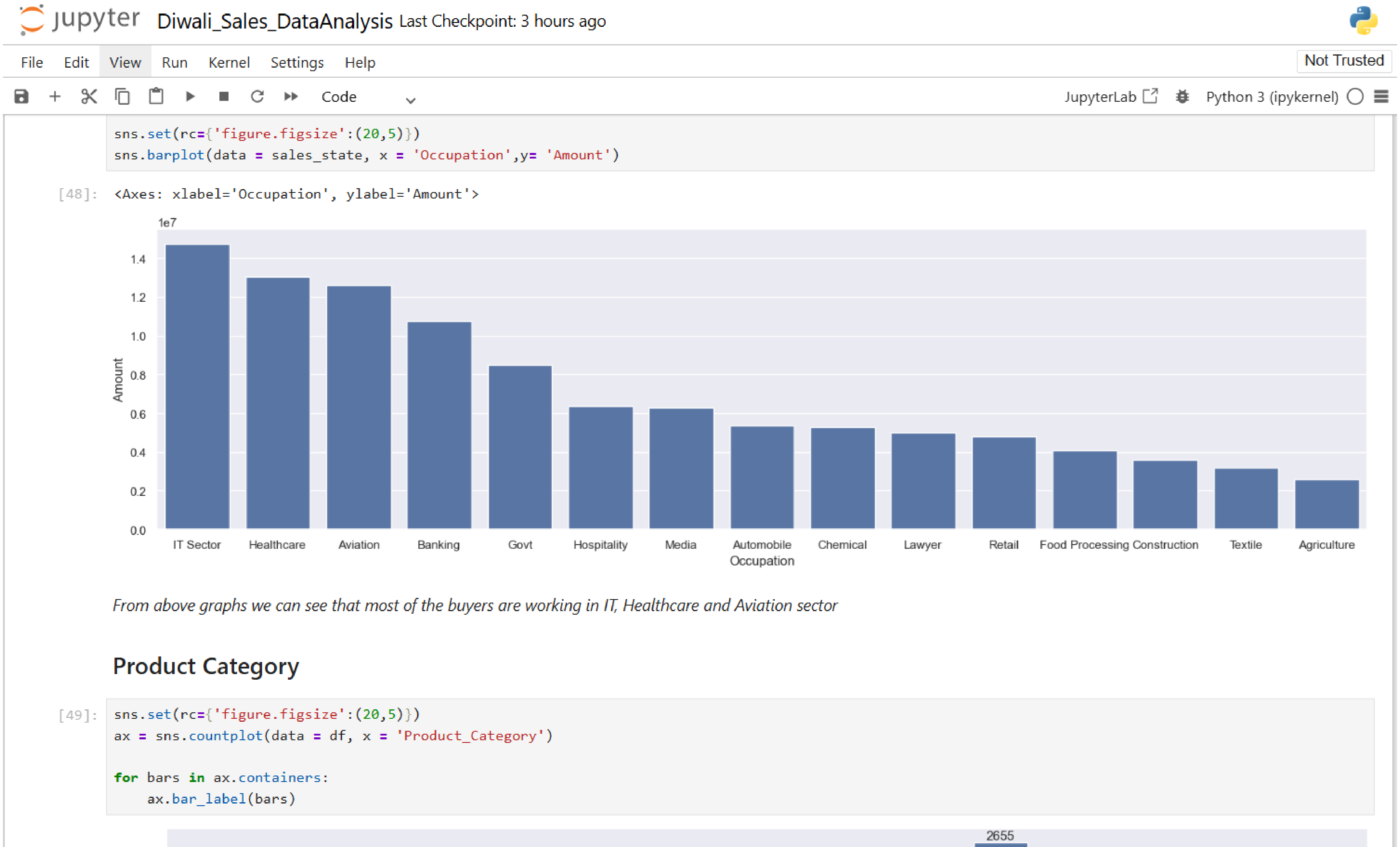
```python
sns.set(rc={'figure.figsize':(20,5)})
ax = sns.countplot(data = df, x = 'Occupation')

for bars in ax.containers:
    ax.bar_label(bars)
```

[48]:

```python
sales_state = df.groupby(['Occupation'], as_index=False)['Amount'].sum().sort_values(by='Amount', ascending=False)

sns.set(rc={'figure.figsize':(20,5)})
sns.barplot(data = sales_state, x = 'Occupation',y= 'Amount')
```

[48]:

```
<Axes: xlabel='Occupation', ylabel='Amount'>
```



```
sns.set(rc={'figure.figsize':(20,5)})
sns.barplot(data = sales_state, x = 'Occupation',y= 'Amount')
```

[48]:

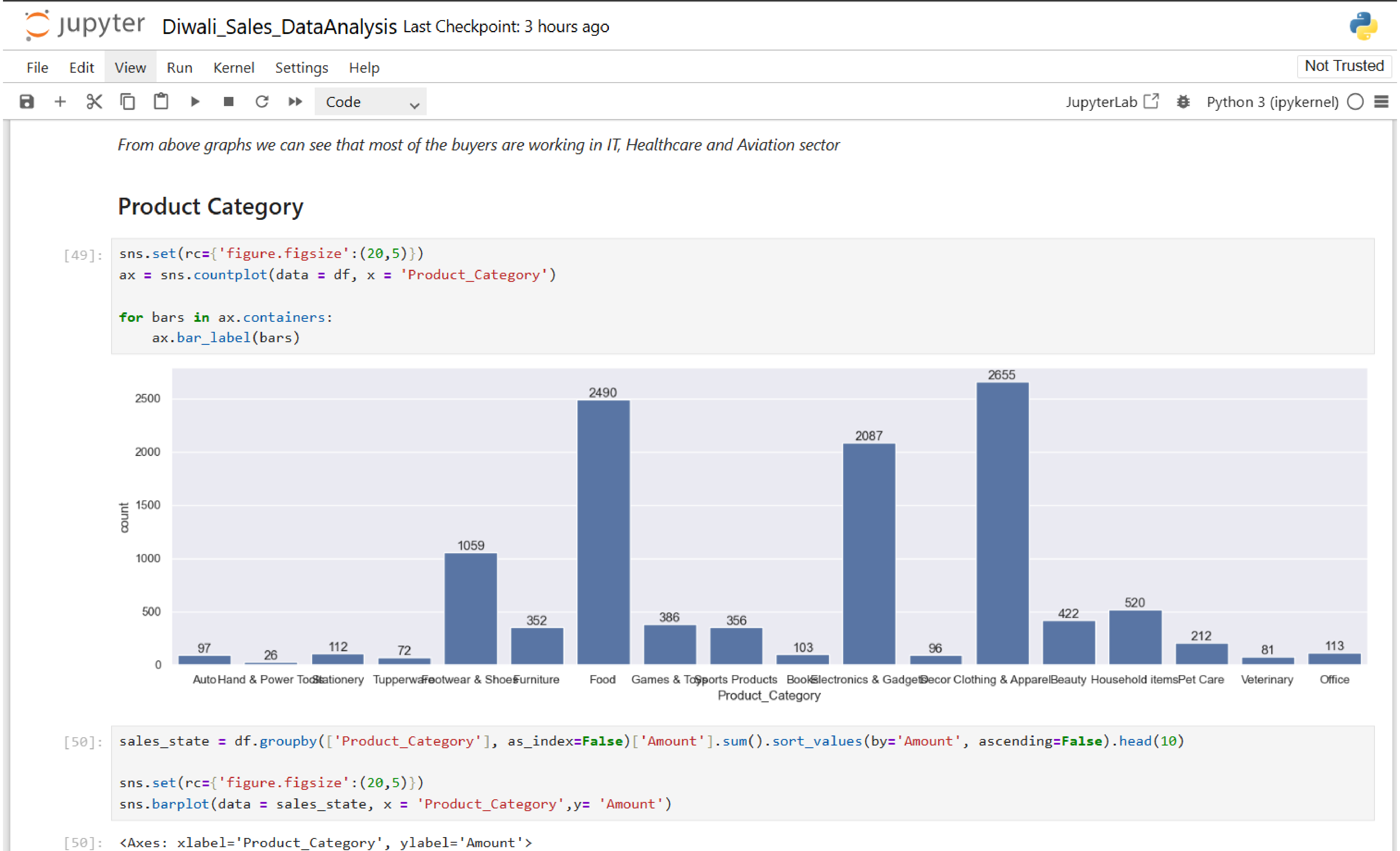
```
<Axes: xlabel='Occupation', ylabel='Amount'>
```

From above graphs we can see that most of the buyers are working in IT, Healthcare and Aviation sector

Product Category

[49]:

```
sns.set(rc={'figure.figsize':(20,5)})
ax = sns.countplot(data = df, x = 'Product_Category')

for bars in ax.containers:
    ax.bar_label(bars)
```



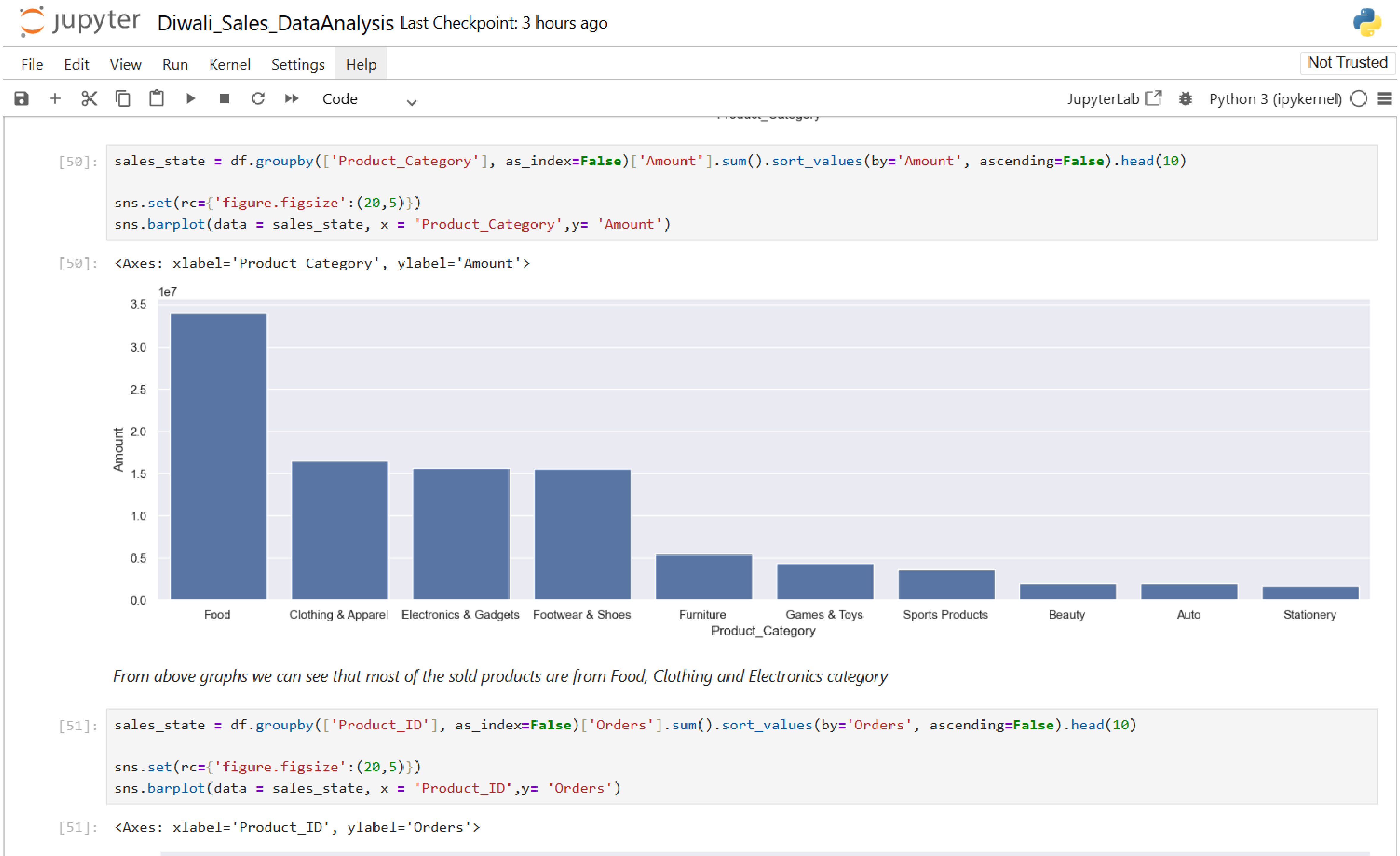
From above graphs we can see that most of the buyers are working in IT, Healthcare and Aviation sector

Product Category

```
[49]: sns.set(rc={'figure.figsize':(20,5)})
      ax = sns.countplot(data = df, x = 'Product_Category')

      for bars in ax.containers:
          ax.bar_label(bars)
```

```
[50]: sales_state = df.groupby(['Product_Category'], as_index=False)['Amount'].sum().sort_values(by='Amount', ascending=False).head(10)

      sns.set(rc={'figure.figsize':(20,5)})
      sns.barplot(data = sales_state, x = 'Product_Category',y= 'Amount')
```

```
[50]: <Axes: xlabel='Product_Category', ylabel='Amount'>
```



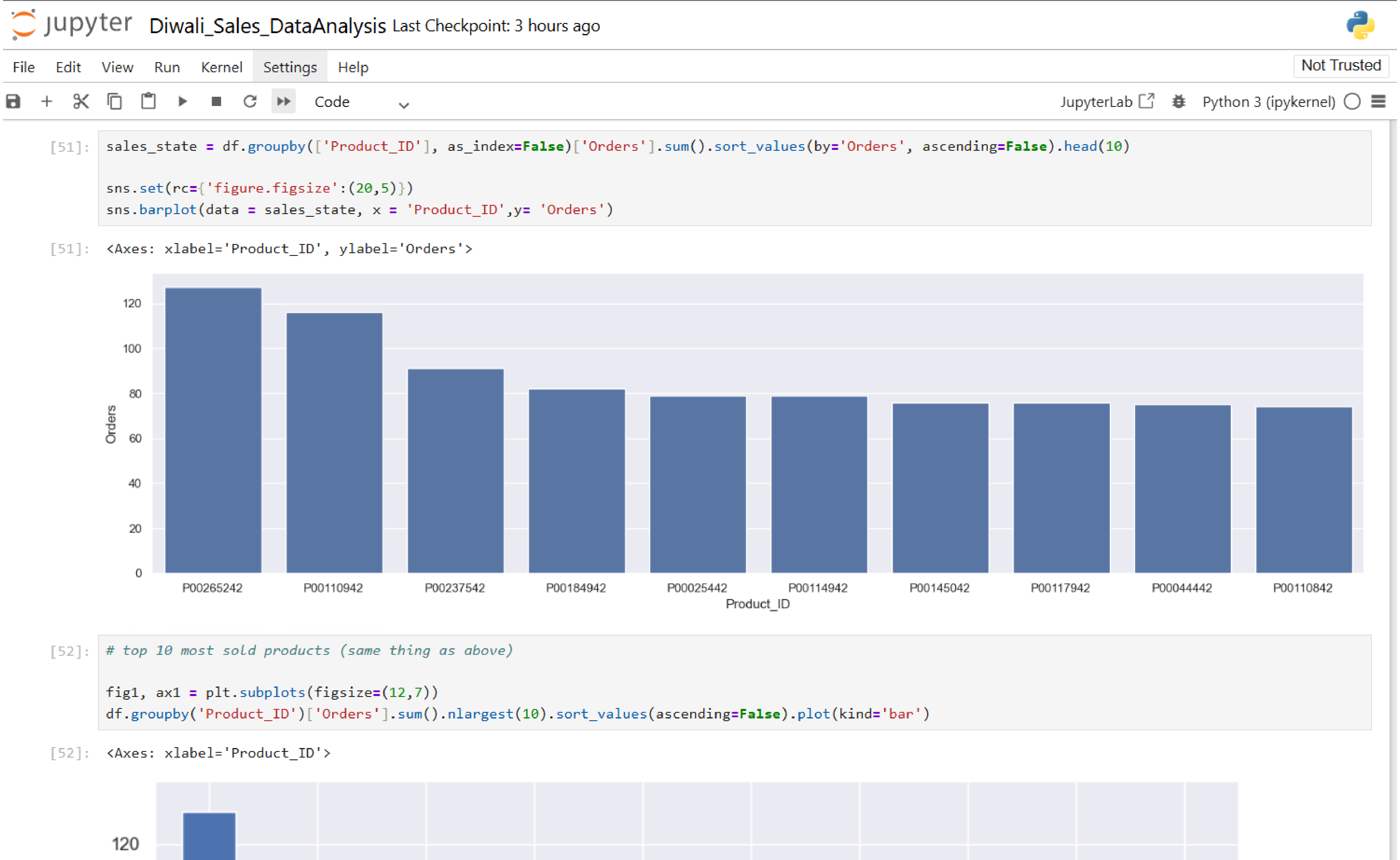
```
[50]: sales_state = df.groupby(['Product_Category'], as_index=False)['Amount'].sum().sort_values(by='Amount', ascending=False).head(10)

      sns.set(rc={'figure.figsize':(20,5)})
      sns.barplot(data = sales_state, x = 'Product_Category',y= 'Amount')
```

```
[50]: <Axes: xlabel='Product_Category', ylabel='Amount'>
```

From above graphs we can see that most of the sold products are from Food, Clothing and Electronics category

```
[51]: sales_state = df.groupby(['Product_ID'], as_index=False)['Orders'].sum().sort_values(by='Orders', ascending=False).head(10)

      sns.set(rc={'figure.figsize':(20,5)})
      sns.barplot(data = sales_state, x = 'Product_ID',y= 'Orders')
```

```
[51]: <Axes: xlabel='Product_ID', ylabel='Orders'>
```

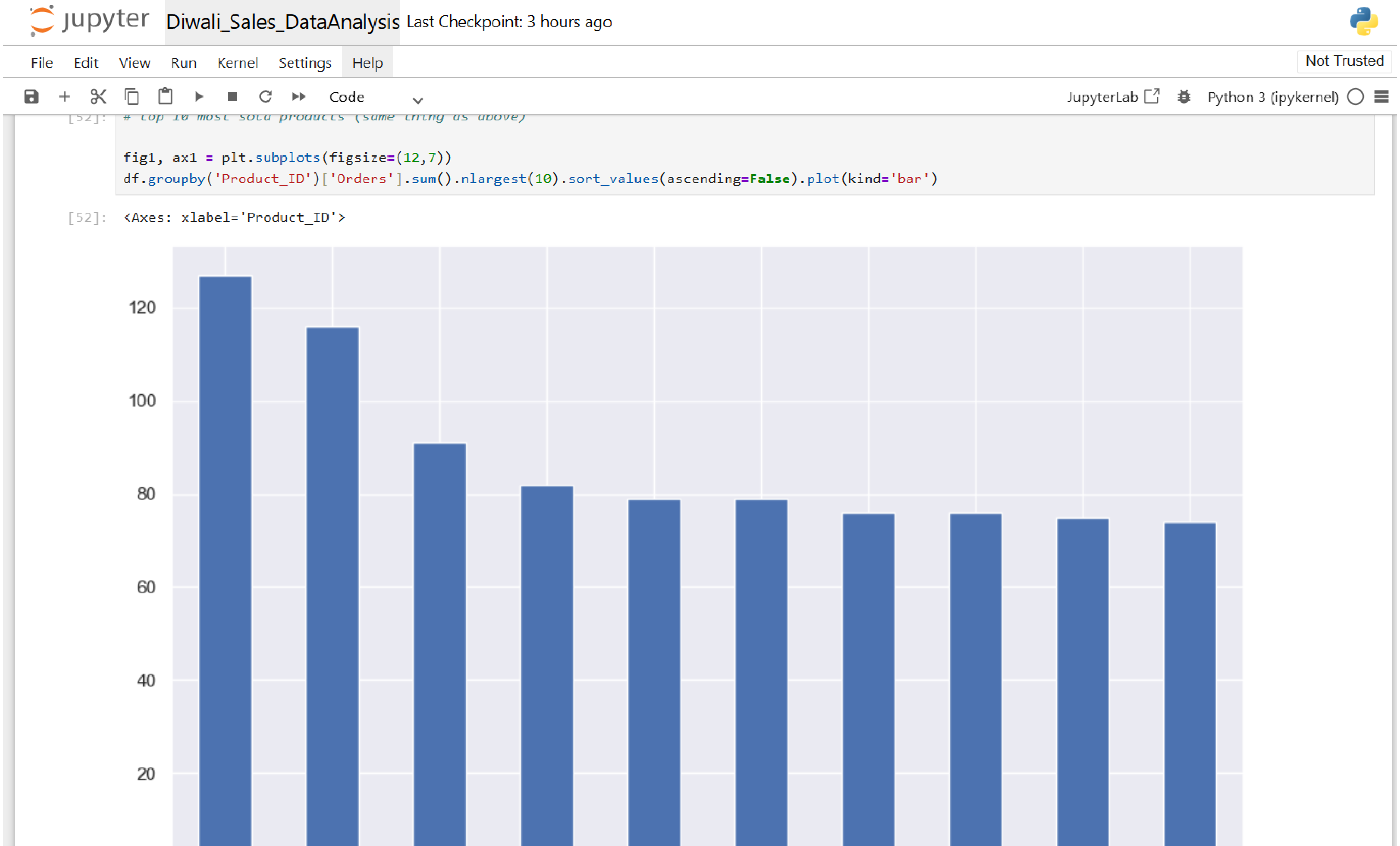


```
[51]: sales_state = df.groupby(['Product_ID'], as_index=False)['Orders'].sum().sort_values(by='Orders', ascending=False).head(10)

      sns.set(rc={'figure.figsize':(20,5)})
      sns.barplot(data = sales_state, x = 'Product_ID',y= 'Orders')
```

```
[51]: <Axes: xlabel='Product_ID', ylabel='Orders'>
```

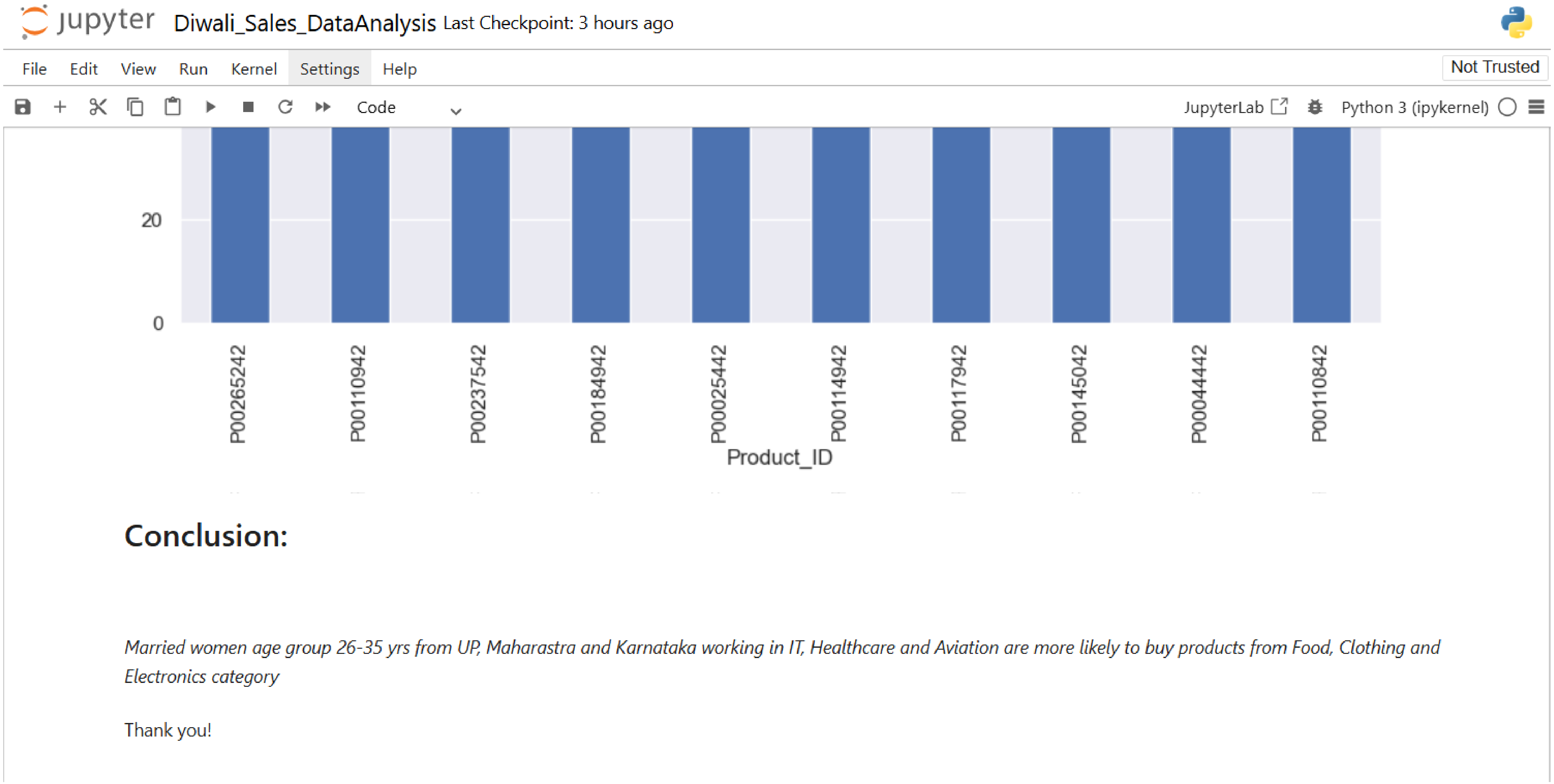
```
[52]: # top 10 most sold products (same thing as above)

      fig1, ax1 = plt.subplots(figsize=(12,7))
      df.groupby('Product_ID')['Orders'].sum().nlargest(10).sort_values(ascending=False).plot(kind='bar')
```

```
[52]: <Axes: xlabel='Product_ID'>
```



```
[52]: # top 10 most sold products (same thing as above)

      fig1, ax1 = plt.subplots(figsize=(12,7))
      df.groupby('Product_ID')['Orders'].sum().nlargest(10).sort_values(ascending=False).plot(kind='bar')
```

```
[52]: <Axes: xlabel='Product_ID'>
```



Conclusion:

Married women age group 26-35 yrs from UP, Maharastra and Karnataka working in IT, Healthcare and Aviation are more likely to buy products from Food, Clothing and Electronics category

Thank you!