Data Analysis for a Sales Data

In [51]:
```
# import libraries

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

In [52]:
```
# load dataset
df = pd.read_csv('Sales Data.csv', encoding='unicode_escape')
```

In [53]:
```
df.shape
```

Out[53]: (11251, 15)

In [54]:
```
df.head(10)
```

Out[54]:

	User_ID	Cust_name	Product_ID	Gender	Age Group	Age	Marital_Status	Stat
0	1002903	Sanskriti	P00125942	F	26-35	28	0	Maharashtı
1	1000732	Kartik	P00110942	F	26-35	35	1	Andhra Prades
2	1001990	Bindu	P00118542	F	26-35	35	1	Uttar Prades
3	1001425	Sudevi	P00237842	M	0-17	16	0	Karnatak
4	1000588	Joni	P00057942	M	26-35	28	1	Gujara
5	1000588	Joni	P00057942	M	26-35	28	1	Himach Prades
6	1001132	Balk	P00018042	F	18-25	25	1	Uttar Prades
7	1002092	Shivangi	P00273442	F	55+	61	0	Maharashtı
8	1003224	Kushal	P00205642	M	26-35	35	0	Uttar Prades
9	1003650	Ginny	P00031142	F	26-35	26	1	Andhra Prades

Data Cleaning

In [55]:
```
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
```

In [56]:
```
# Drop blank columns
df.drop(['Status', 'unnamed1'], axis=1, inplace=True)
```

In [57]:
```
# Check for null values
pd.isnull(df).sum()
```

Out[57]:
```
User_ID             0
Cust_name           0
Product_ID          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
```

In [58]:
```
# Drop Null values
df.dropna(inplace=True)
```

In [59]:
```
# Change the datatype of Amount column from float to int
df['Amount'] = df['Amount'].astype('int')
df['Amount'].dtypes
```

Out[59]:
```
dtype('int64')
```

In [60]:
```
df.columns
```

Out[60]:
```
Index(['User_ID', 'Cust_name', 'Product_ID', 'Gender', 'Age Group', 'Age',
       'Marital_Status', 'State', 'Zone', 'Occupation', 'Product_Category',
       'Orders', 'Amount'],
      dtype='object')
```

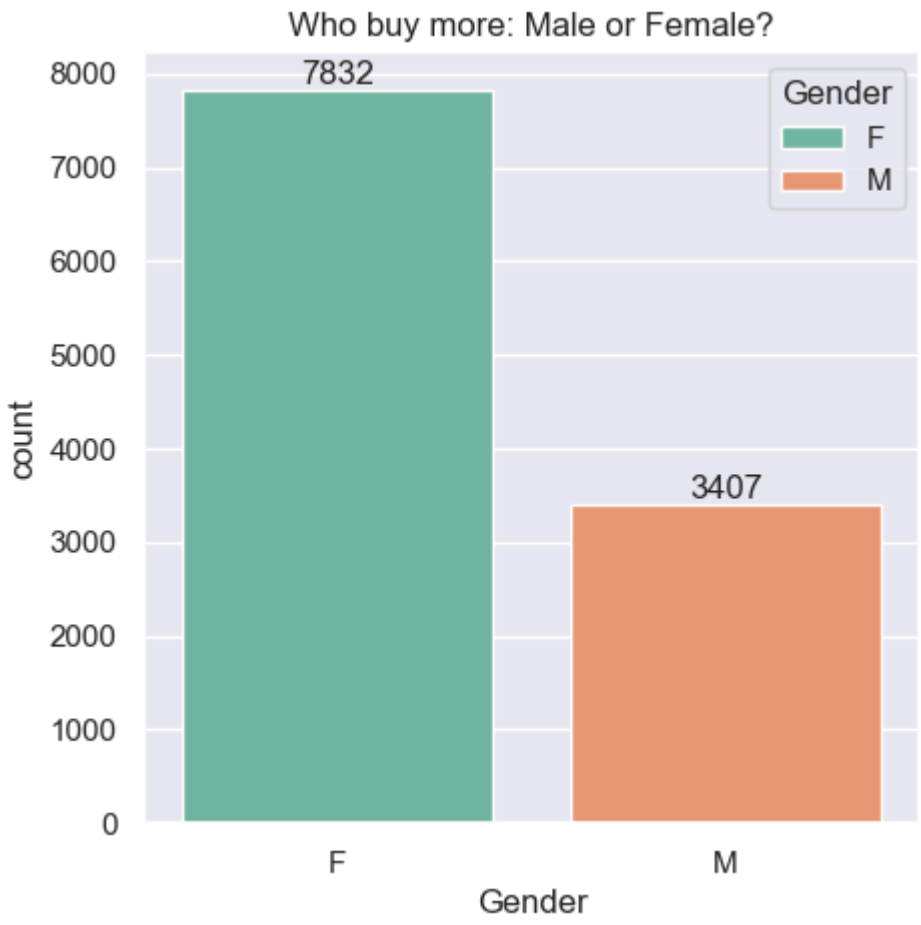
In [61]:
```
df.describe()
```

Out[61]:

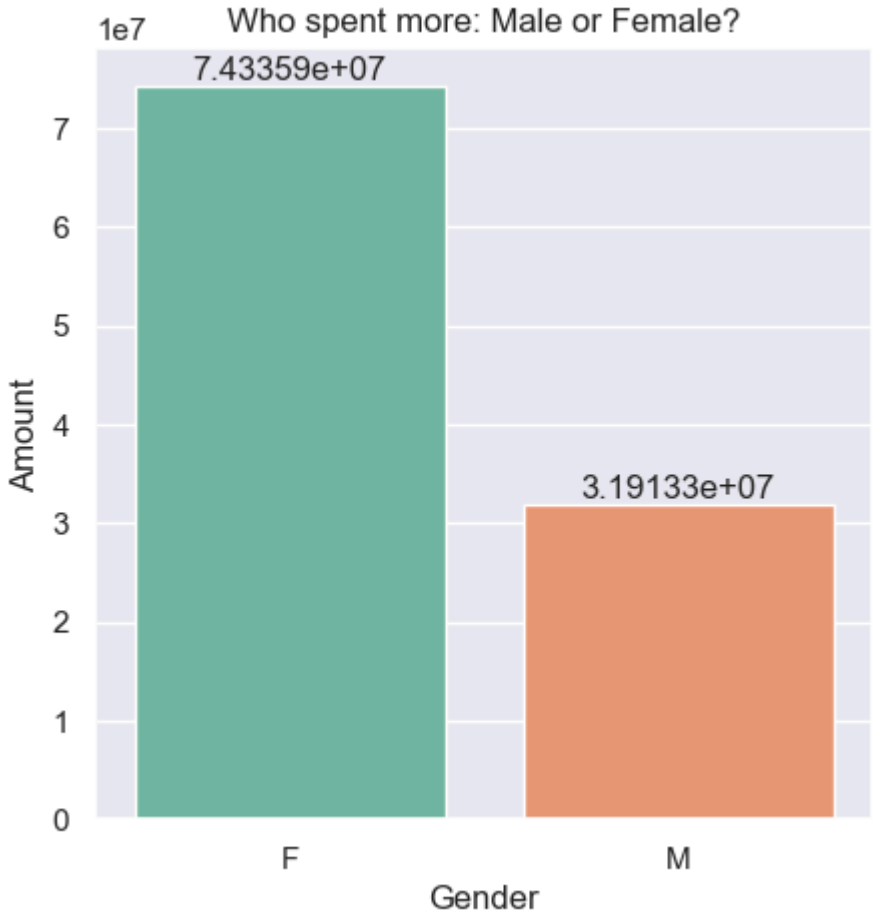
	User_ID	Age	Marital_Status	Orders	Amount
count	1.123900e+04	11239.000000	11239.000000	11239.000000	11239.000000
mean	1.003004e+06	35.410357	0.420055	2.489634	9453.610553
std	1.716039e+03	12.753866	0.493589	1.114967	5222.355168
min	1.000001e+06	12.000000	0.000000	1.000000	188.000000
25%	1.001492e+06	27.000000	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

Exploratory Data Analysis (EDA)

In [62]:
```
# Gender based
sns.set(rc={'figure.figsize':(5,5)})
ax = sns.countplot(data=df, x='Gender', hue='Gender', palette='Set2', legend=Tru

for container in ax.containers:
    ax.bar_label(container)

plt.title("Who buy more: Male or Female?")
plt.show()
```



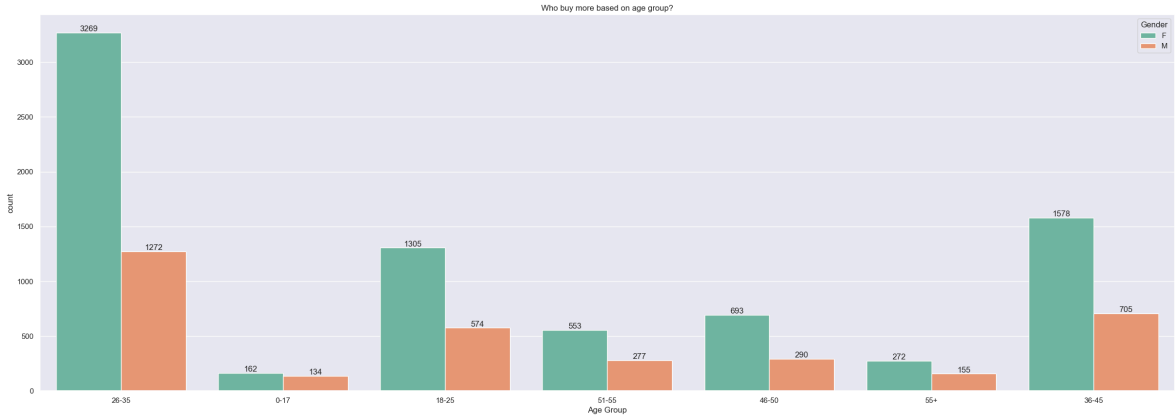
In [63]:
```
# Based on Amount who expense more male or female?

sns.set(rc={'figure.figsize':(5,5)})

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

ax = sns.barplot(x='Gender', y='Amount', data=sales_gen, hue='Gender', palette='

for container in ax.containers:
    ax.bar_label(container)

plt.title("Who spent more: Male or Female?")
plt.show()
```



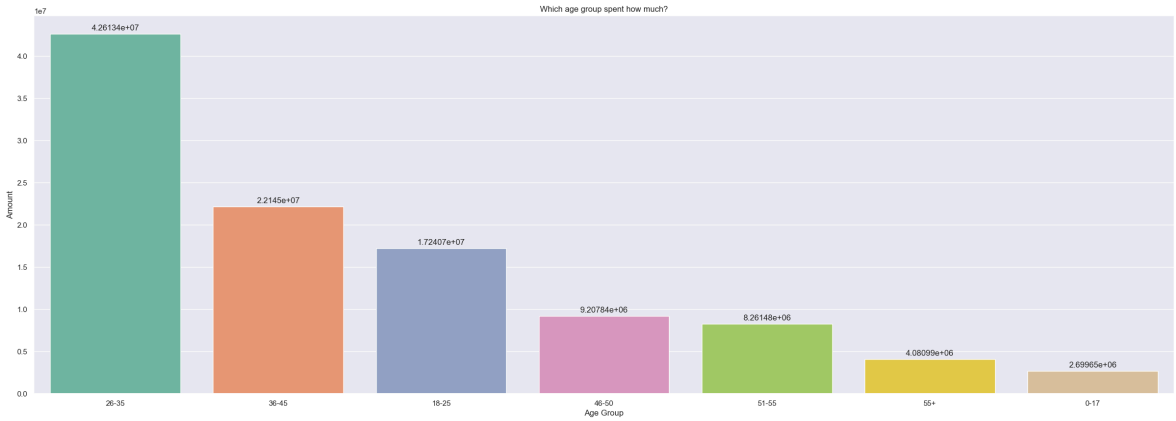
From above graphs we can see that most of the buyers are female and also they spent more.

AGE

In [75]:
```
# Age group

ax = sns.countplot(data=df, x='Age Group', hue='Gender', palette='Set2', legend=

for container in ax.containers:
    ax.bar_label(container)

plt.title("Who buy more based on age group?")
plt.show()
```



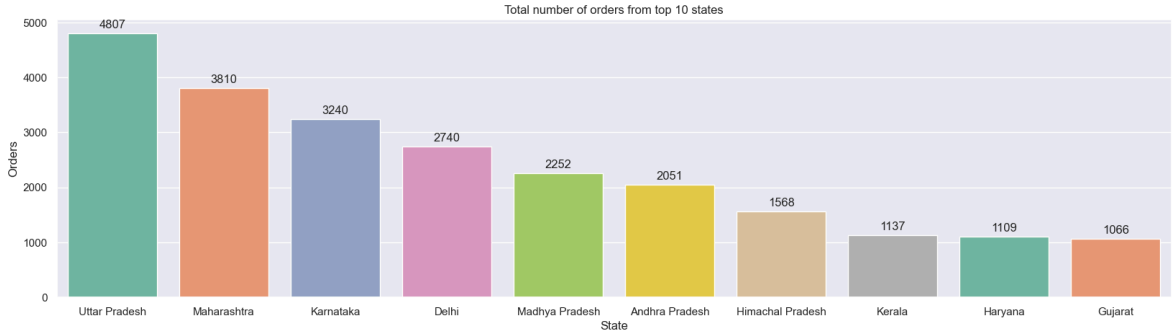
In [76]:
```
# Based on Amount which age group expense more?

sales_age = df.groupby('Age Group', as_index=False)['Amount'].sum()
sales_age = sales_age.sort_values(by='Amount', ascending=False)

ax = sns.barplot(x='Age Group', y='Amount', data=sales_age,hue='Age Group', pale

for container in ax.containers:
    ax.bar_label(container, label_type='edge', padding=3)

plt.title("Which age group spent how much?")
plt.show()
```



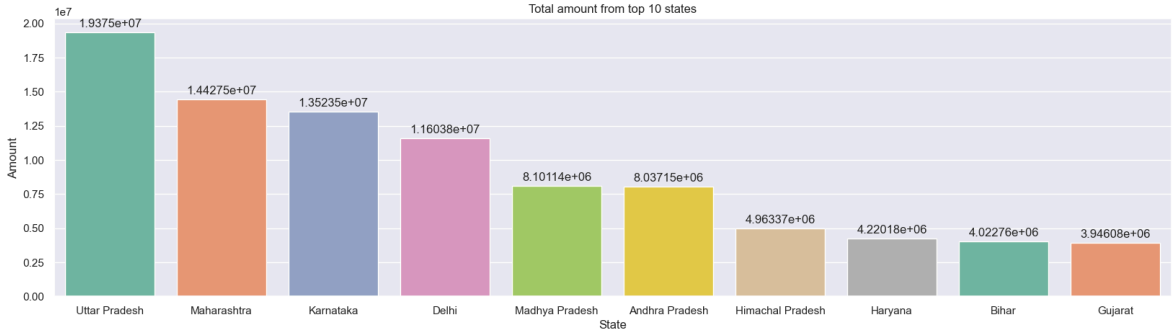
From above graphs we can see that most of the buyers are female and age group between 26-35

State

In [66]:
```
# Total number of orders from top 10 states

sns.set(rc={'figure.figsize':(20,5)})

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

ax = sns.barplot(x='State', y='Orders', data=sales_state, hue='State', palette='

for container in ax.containers:
    ax.bar_label(container, label_type='edge', padding=3)
plt.title("Total number of orders from top 10 states")
plt.show()
```

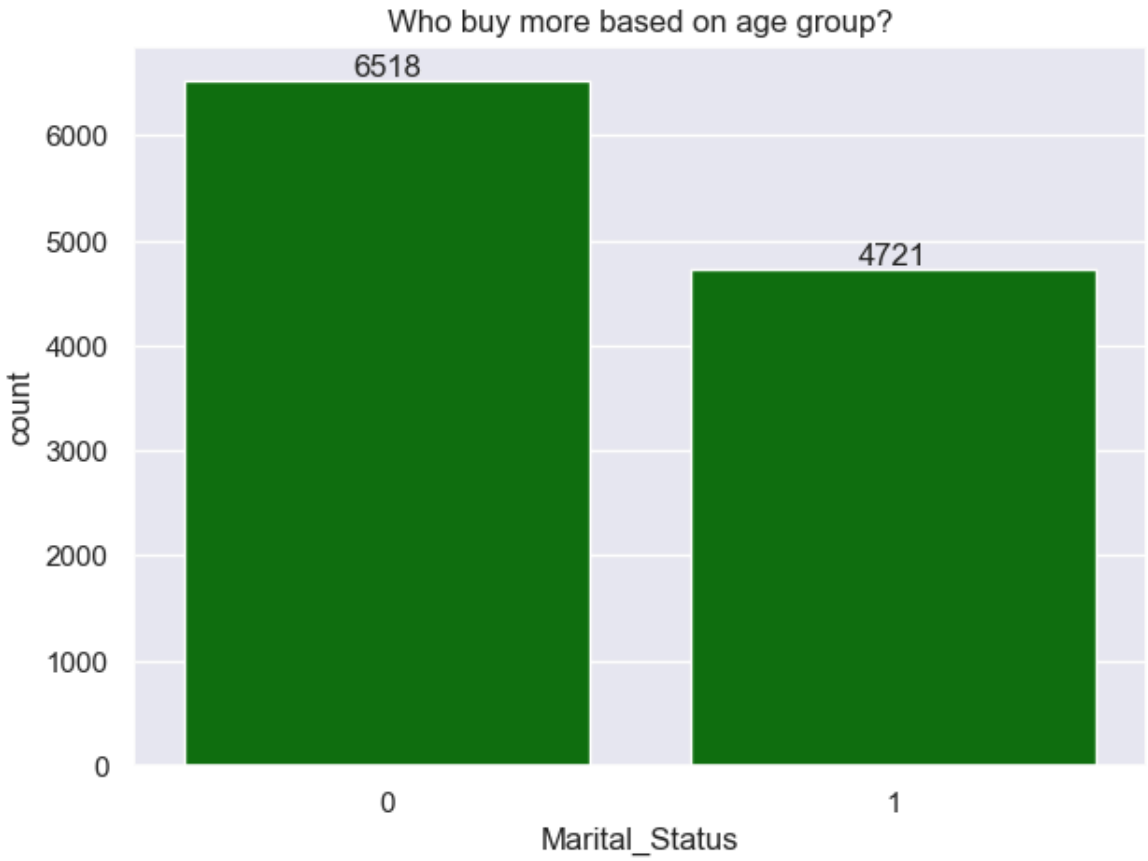


In [67]:
```
# Total amount from top 10 states

sns.set(rc={'figure.figsize':(20,5)})

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

ax = sns.barplot(x='State', y='Amount', data=sales_state, hue='State', palette='

for container in ax.containers:
    ax.bar_label(container, label_type='edge', padding=3)
plt.title("Total amount from top 10 states")
plt.show()
```

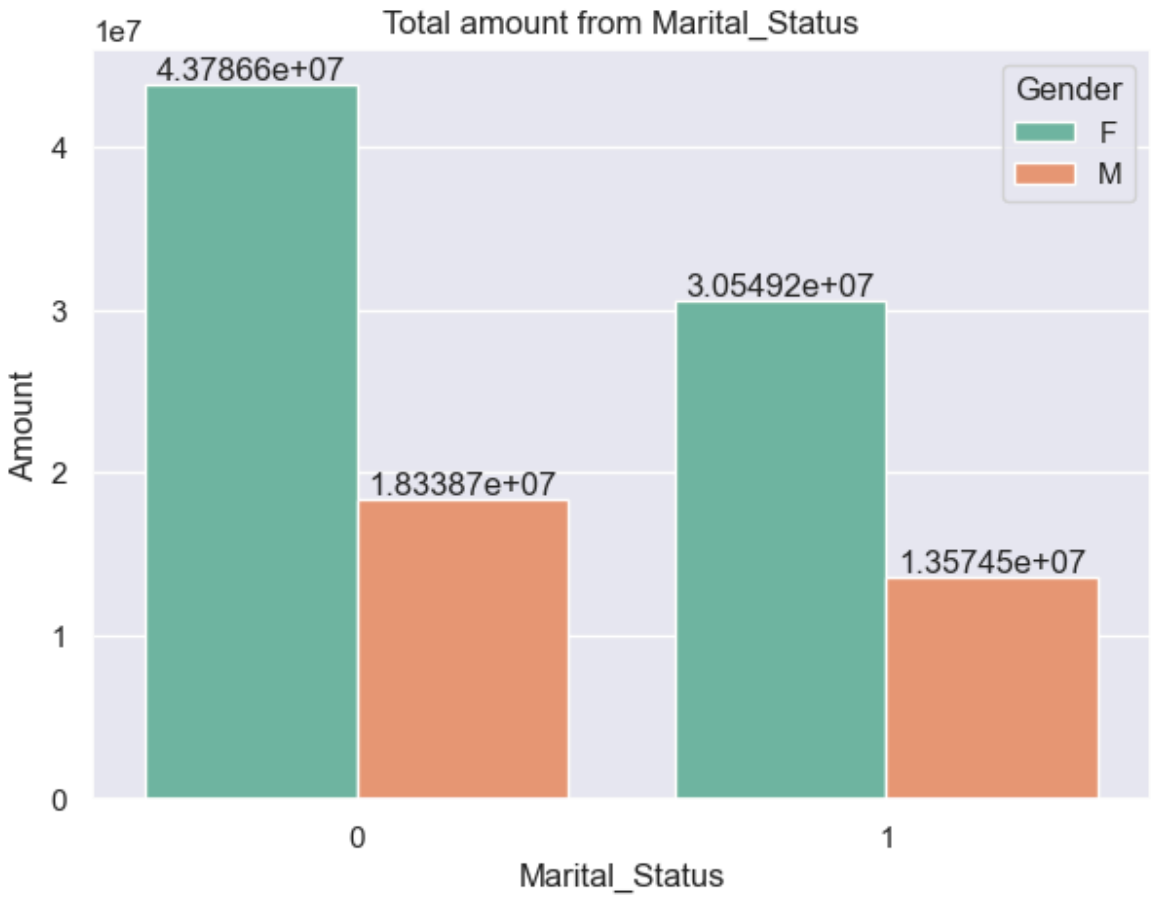


Marital Status

In [78]:
```
ax = sns.countplot(data=df, x='Marital_Status', color= 'green', legend=True)

for container in ax.containers:
    ax.bar_label(container)

sns.set(rc={'figure.figsize':(7,5)})

plt.title("Who buy more based on age group?")
plt.show()
```



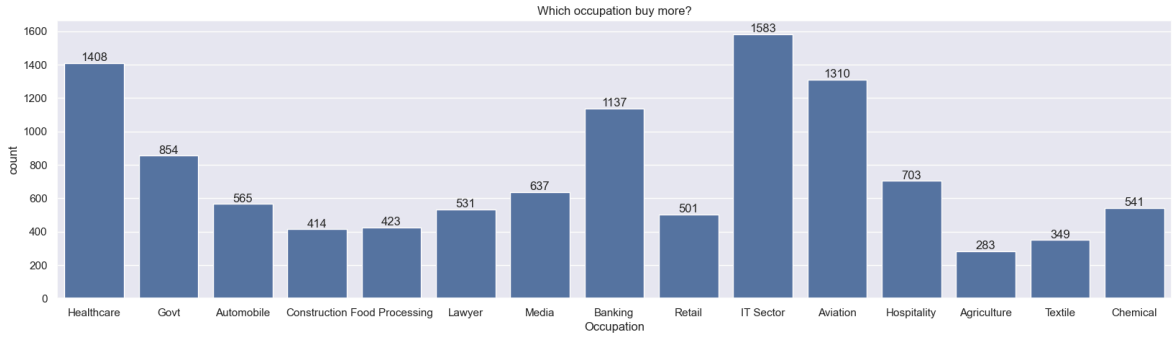
In [69]:
```
# Total amount from Marital_Status

sns.set(rc={'figure.figsize':(7,5)})

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

ax = sns.barplot(x='Marital_Status', y='Amount', data=sales_state, hue='Gender',

for container in ax.containers:
    ax.bar_label(container)
plt.title("Total amount from Marital_Status")
plt.show()
```



From above graphs we can see that most of the buyers are female and Married

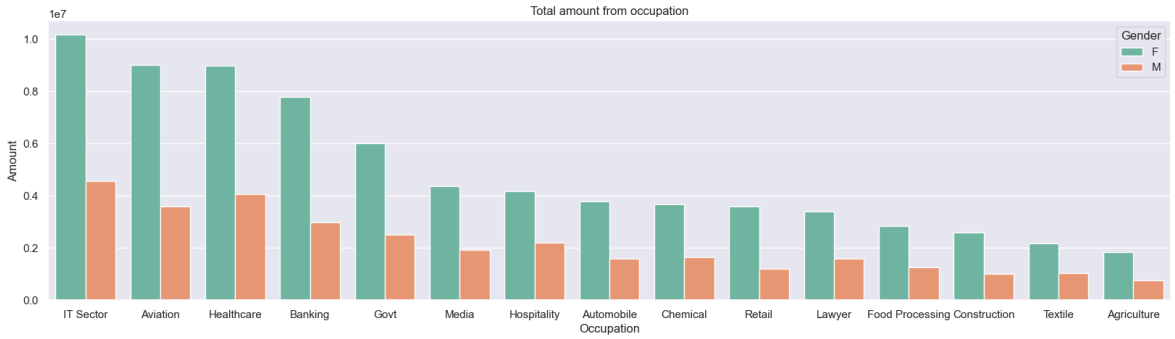
Occupation

In [70]:
```
sns.set(rc={'figure.figsize':(20,5)})

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

for container in ax.containers:
    ax.bar_label(container)

plt.title("Which occupation buy more?")
plt.show()
```



In [71]:
```
# Total amount from occupation

sns.set(rc={'figure.figsize':(20,5)})

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

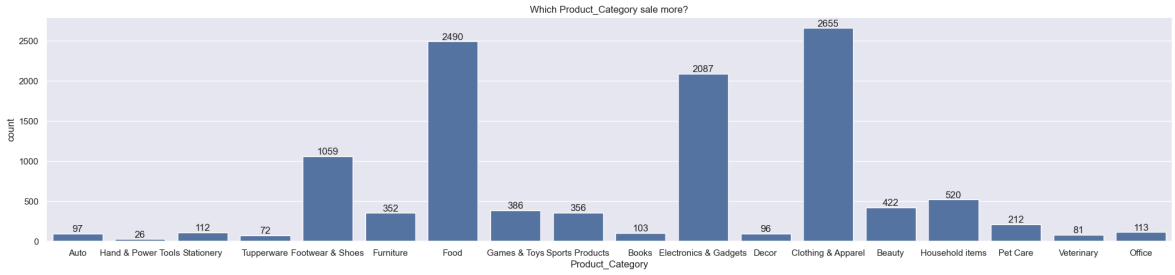
```
ax = sns.barplot(x='Occupation', y='Amount', data=sales_state, hue='Gender', pal

plt.title("Total amount from occupation")
plt.show()
```



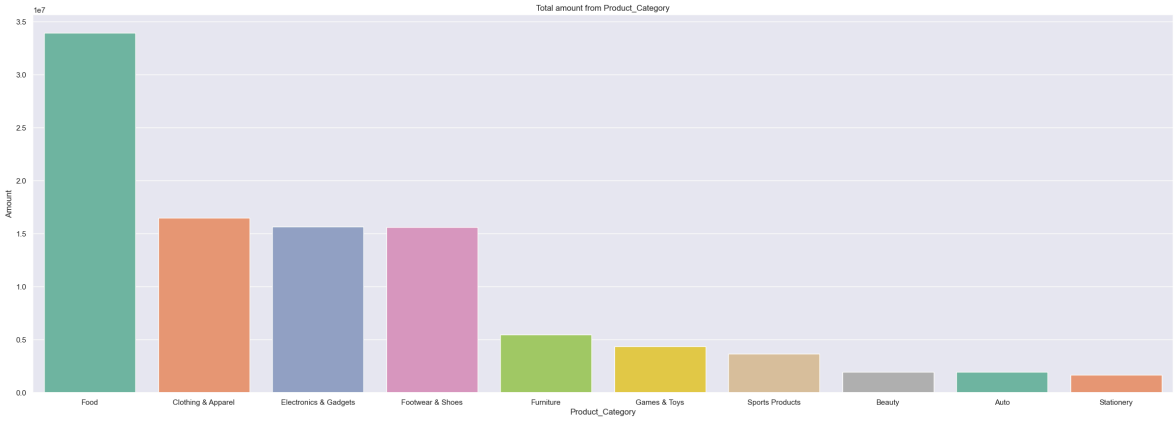
From above graphs we can see that most of the buyers are female and from IT Sector

Product_Category

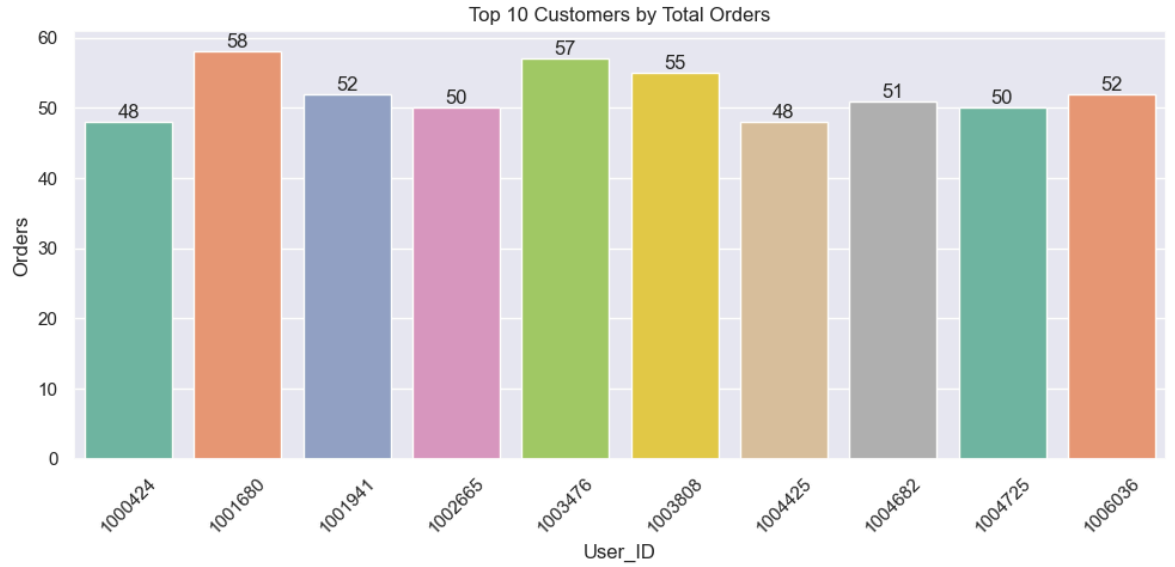
In [72]:
```
sns.set(rc={'figure.figsize':(25,5)})

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

for container in ax.containers:
    ax.bar_label(container)

plt.title("Which Product_Category sale more?")
plt.show()
```



In [73]:
```
# Total amount from Product_Category

sns.set(rc={'figure.figsize':(30,10)})

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

ax = sns.barplot(x='Product_Category', y='Amount', data=sales_state, hue='Produc

plt.title("Total amount from Product_Category")
plt.show()
```



In [74]:
```
# Top 10 customers by total orders
top_customers = (
    df.groupby('User_ID', as_index=False)['Orders'].sum()
      .sort_values(by='Orders', ascending=False).head(10)
)

plt.figure(figsize=(10,5))
ax = sns.barplot(data=top_customers, x='User_ID', y='Orders', hue='User_ID', pal

for container in ax.containers:
    ax.bar_label(container)

plt.xticks(rotation=45)
plt.title("Top 10 Customers by Total Orders")
plt.tight_layout()
plt.show()
```



Conclusion & Key Insights

Sales data shows that married women aged 26–35 are the most active buyers, mainly from UP, Maharashtra, and Karnataka, and largely working in IT, Healthcare, and Aviation.

Food, Clothing, and Electronics dominate both orders and revenue, making them the core focus for future campaigns.

Recommendation:

Focus marketing on married women (26–35) in top states.

Offer personalized discounts and loyalty programs.

Ensure strong inventory and delivery network in key regions.

This targeted approach will improve sales, customer satisfaction, and overall growth.