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Pulkit Mehrotra Project : Amazon Sales Data Analysis

In [1]:
```python
# importing required libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```python
df = pd.read_csv("Amazon Sales data.csv")
#df.style.set_caption('Amazon Sales Data Analysis')
df.head(3)
```

Out[2]:

	Region	Country	Item Type	Sales Channel	Order Priority	Order Date	Order ID	Ship Date	Units Sold	Unit Price	Unit Cost	Total Revenue	Total Cost	Total Profit
0	Australia and Oceania	Tuvalu	Baby Food	Offline	H	5/28/2010	669165933	6/27/2010	9925	255.28	159.42	2533654.00	1582243.50	951410.50
1	Central America and the Caribbean	Grenada	Cereal	Online	C	8/22/2012	963881480	9/15/2012	2804	205.70	117.11	576782.80	328376.44	248406.36
2	Europe	Russia	Office Supplies	Offline	L	5/2/2014	341417157	5/8/2014	1779	651.21	524.96	1158502.59	933903.84	224598.75

Getting information about the Data.

In [3]:
```python
# checking the shape
df.shape
```

Out[3]: (100, 14)

In [4]:
```python
# checking the columns in the data
df.columns
```

Out[4]:
```
Index(['Region', 'Country', 'Item Type', 'Sales Channel', 'Order Priority',
       'Order Date', 'Order ID', 'Ship Date', 'Units Sold', 'Unit Price',
       'Unit Cost', 'Total Revenue', 'Total Cost', 'Total Profit'],
      dtype='object')
```

In [5]:
```python
# Basic info about data
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100 entries, 0 to 99
Data columns (total 14 columns):
 #   Column          Non-Null Count  Dtype
---  ------          --------------  -----
 0   Region          100 non-null    object
 1   Country         100 non-null    object
 2   Item Type       100 non-null    object
 3   Sales Channel   100 non-null    object
 4   Order Priority  100 non-null    object
 5   Order Date      100 non-null    object
 6   Order ID        100 non-null    int64
 7   Ship Date       100 non-null    object
 8   Units Sold      100 non-null    int64
 9   Unit Price      100 non-null    float64
 10  Unit Cost       100 non-null    float64
 11  Total Revenue   100 non-null    float64
 12  Total Cost      100 non-null    float64
 13  Total Profit    100 non-null    float64
dtypes: float64(5), int64(2), object(7)
memory usage: 11.1+ KB
```

here we have Data type **float64**, **int64**, **object** and **datetime64[ns]**

In [6]:
```python
# Getting more info about data like count, mean, min, max.
df.describe()
```

Out[6]:

	Order ID	Units Sold	Unit Price	Unit Cost	Total Revenue	Total Cost	Total Profit
count	1.000000e+02	100.000000	100.000000	100.000000	1.000000e+02	1.000000e+02	1.000000e+02
mean	5.550204e+08	5128.710000	276.761300	191.048000	1.373488e+06	9.318057e+05	4.416820e+05
std	2.606153e+08	2794.484562	235.592241	188.208181	1.460029e+06	1.083938e+06	4.385379e+05
min	1.146066e+08	124.000000	9.330000	6.920000	4.870260e+03	3.612240e+03	1.258020e+03
25%	3.389225e+08	2836.250000	81.730000	35.840000	2.687212e+05	1.688680e+05	1.214436e+05
50%	5.577086e+08	5382.500000	179.880000	107.275000	7.523144e+05	3.635664e+05	2.907680e+05
75%	7.907551e+08	7369.000000	437.200000	263.330000	2.212045e+06	1.613870e+06	6.358288e+05
max	9.940222e+08	9925.000000	668.270000	524.960000	5.997055e+06	4.509794e+06	1.719922e+06

In [7]:
```python
# checking if any null values present in the data
df.isnull().sum()
```

Out[7]:
```
Region            0
Country           0
Item Type         0
Sales Channel     0
Order Priority    0
Order Date        0
Order ID          0
Ship Date         0
Units Sold        0
Unit Price        0
Unit Cost         0
Total Revenue     0
Total Cost        0
Total Profit      0
dtype: int64
```

In [8]:
```python
# Cheking also for any duplicates values in the data
df.duplicated().sum()
```

Out[8]: 0

observation : No Duplicate values in data

In [9]:
```python
df.columns
```

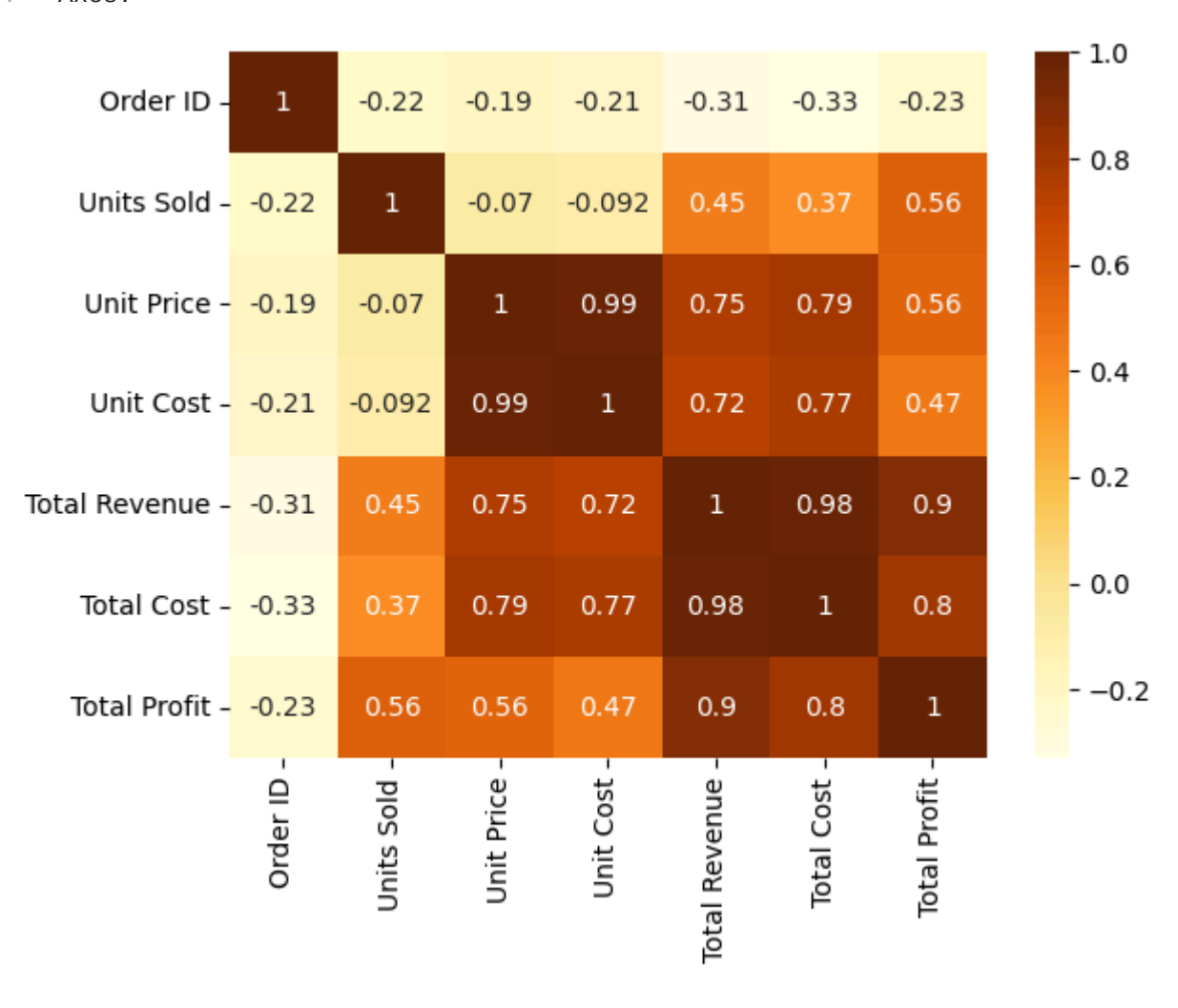
Out[9]:
```
Index(['Region', 'Country', 'Item Type', 'Sales Channel', 'Order Priority',
       'Order Date', 'Order ID', 'Ship Date', 'Units Sold', 'Unit Price',
       'Unit Cost', 'Total Revenue', 'Total Cost', 'Total Profit'],
      dtype='object')
```

Now let's create heatmap to find correlation between features.

In [10]:
```python
sns.heatmap(df.corr(method='pearson'),annot=True, cmap='YlOrBr')
```

```
<ipython-input-10-b0af1229f951>:1: FutureWarning: The default value of numeric_only in DataFrame.corr is deprecated. In a future version, it will default to False. Select only valid columns or specify the value of numeric_only to silence this warning.
  sns.heatmap(df.corr(method='pearson'),annot=True, cmap='YlOrBr')
```

Out[10]: <Axes: >



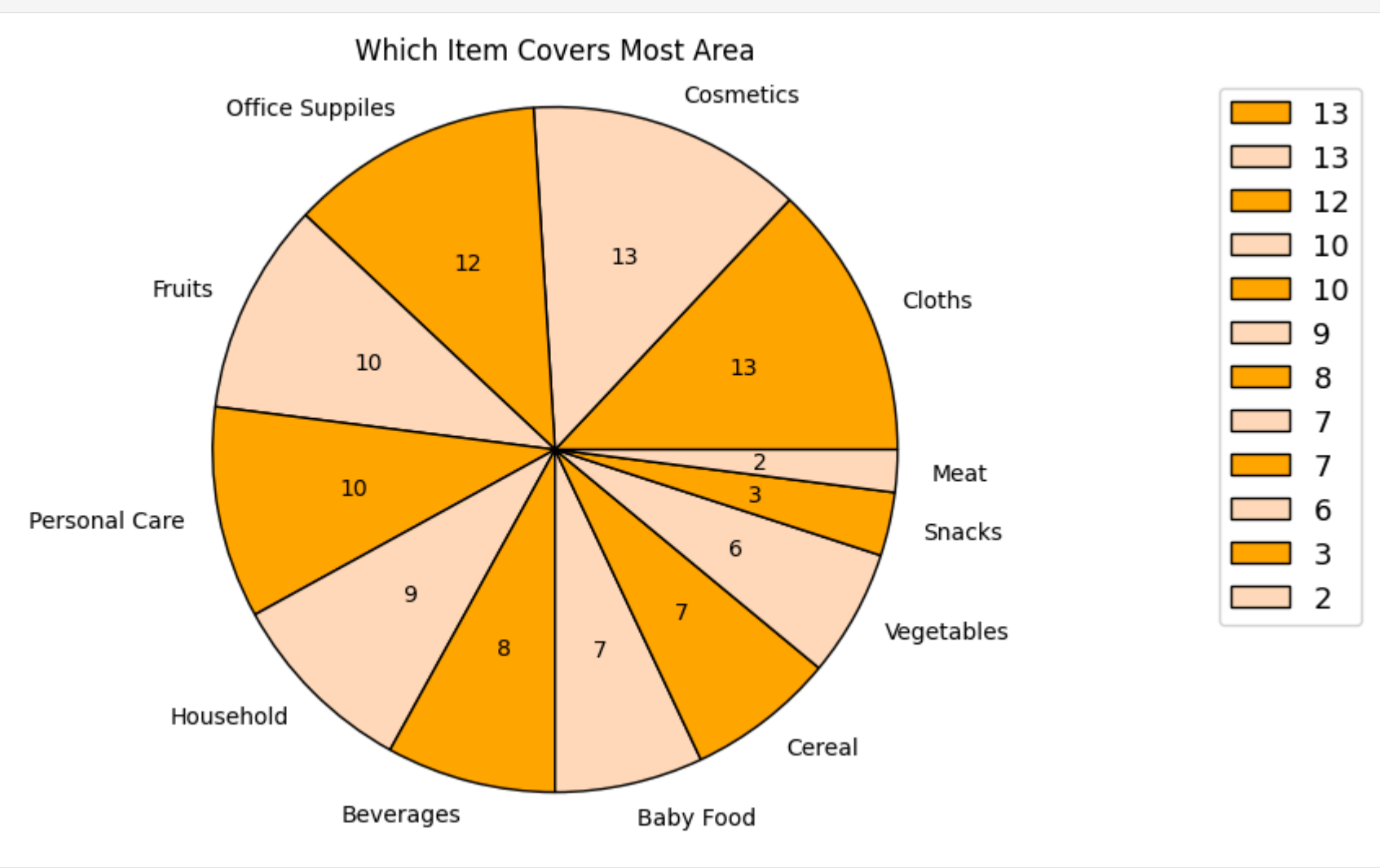
Observations:

- As you can see in the above heatmap **Unit Price** and **Unit Cost** are Highly corelated.
- Also **Unit Price** moderately related to **Total Revenue** and **Total Cost** but less related to **Total Profit**.
- lastly their No relation between **Order ID** and rest other features.

In [11]:
```python
df['Item Type'].value_counts()
```

Out[11]:
```
Clothes            13
Cosmetics          13
Office Supplies    12
Fruits             10
Personal Care      10
Household           9
Beverages           8
Baby Food           7
Cereal              7
Vegetables          6
Snacks              3
Meat                2
Name: Item Type, dtype: int64
```

In [12]:
```python
wp = { 'linewidth' : 1, 'edgecolor' : "black" }
labels = ('Cloths','Cosmetics','Office Suppiles','Fruits','Personal Care','Household','Beverages','Baby Food','Cereal','Vegetables','Snacks'
colors = ('orange','peachpuff','orange','peachpuff','orange','peachpuff','orange','peachpuff','orange','peachpuff','orange','peachpuff')
plt.figure(figsize = (13, 6))
plt.pie(df['Item Type'].value_counts(),data = df,
        autopct = '%0.0f',shadow = False ,
        colors = colors,labels = labels,
        wedgeprops = wp)
plt.axis('equal')
plt.title('Which Item Covers Most Area')
plt.legend(df['Item Type'].value_counts(), fontsize= 13)
plt.show()
```



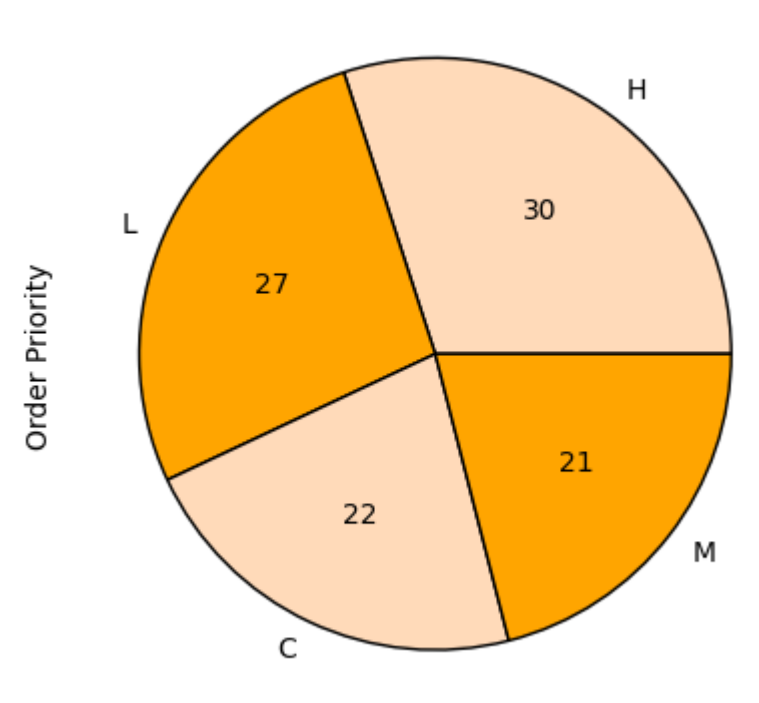
In [13]:
```python
df['Order Priority'].value_counts()
```

Out[13]:
```
H    30
L    27
C    22
M    21
Name: Order Priority, dtype: int64
```

In [14]:
```python
df['Order Priority'].value_counts().to_dict()
```

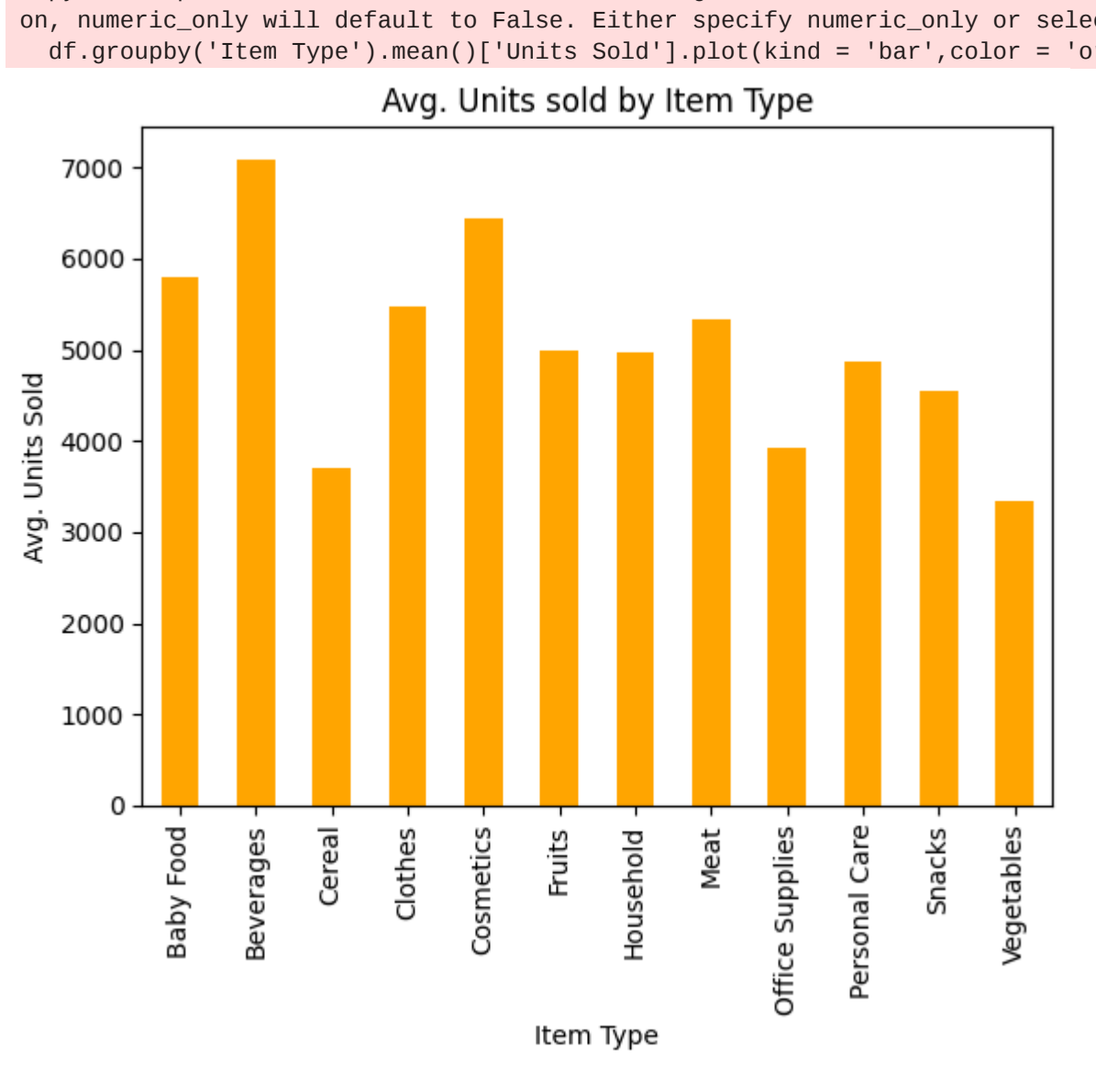
Out[14]: {'H': 30, 'L': 27, 'C': 22, 'M': 21}

In [15]:
```python
colors = {'orange','peachpuff','orange','peachpuff'}
wp = {'linewidth': 1, 'edgecolor': 'black'}
df['Order Priority'].value_counts().plot(kind='pie',colors = colors,wedgeprops = wp, autopct = '%0.0f')
plt.show()
```



In [16]:
```python
df.groupby('Item Type').mean()['Units Sold'].plot(kind = 'bar',color = 'orange')
plt.title('Avg. Units sold by Item Type')
plt.xlabel('Item Type')
plt.ylabel('Avg. Units Sold')
plt.show()
```

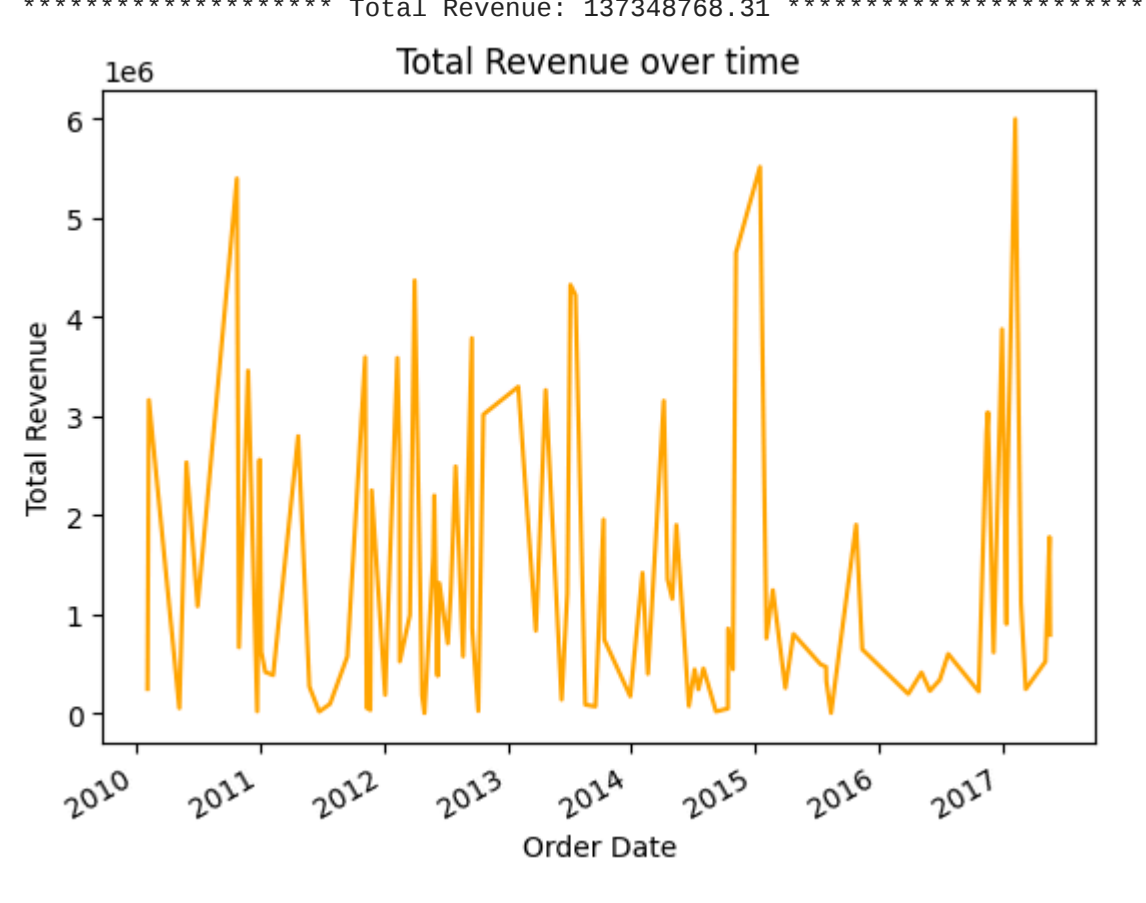
```
<ipython-input-16-62d8c45e361f>:1: FutureWarning: The default value of numeric_only in DataFrameGroupBy.mean is deprecated. In a future versi
on, numeric_only will default to False. Either specify numeric_only or select only columns which should be valid for the function.
  df.groupby('Item Type').mean()['Units Sold'].plot(kind = 'bar',color = 'orange')
```



In [17]:
```python
df['Order Date'] = pd.to_datetime(df['Order Date'])
```

In [18]:
```python
df.groupby('Order Date').sum()['Total Revenue'].plot(kind = 'line',color = 'orange')
plt.title('Total Revenue over time')
plt.xlabel('Order Date')
plt.ylabel('Total Revenue')
print('*'*20,'Total Revenue:',df['Total Revenue'].sum(),'*'*23)
plt.show()
```

```
<ipython-input-18-8e341408ad93>:1: FutureWarning: The default value of numeric_only in DataFrameGroupBy.sum is deprecated. In a future versio
n, numeric_only will default to False. Either specify numeric_only or select only columns which should be valid for the function.
  df.groupby('Order Date').sum()['Total Revenue'].plot(kind = 'line',color = 'orange')
******************** Total Revenue: 137348768.31 ***********************
```

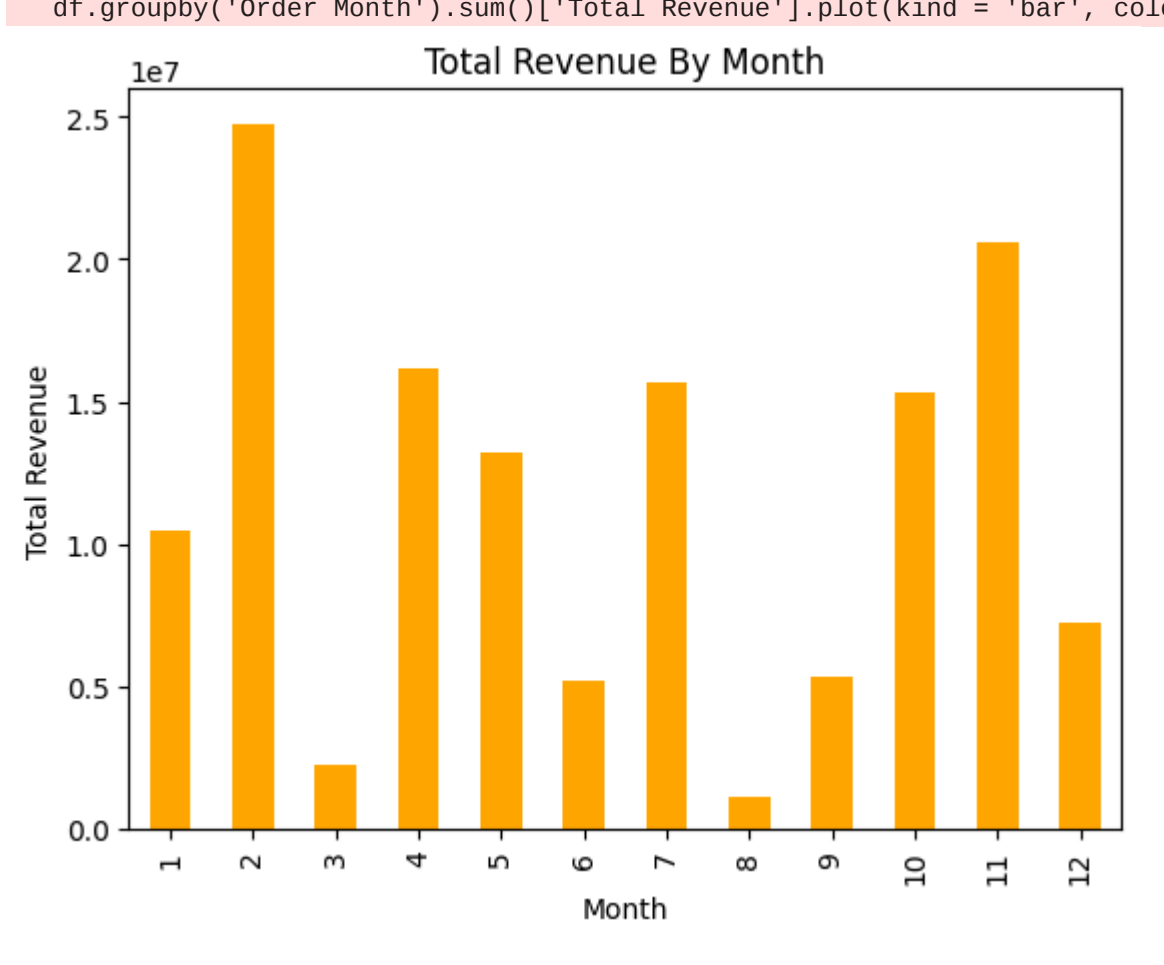


Month-wise Sales

In [19]:
```python
df['Order Month'] = df['Order Date'].dt.month
```

In [20]:
```python
df.groupby('Order Month').sum()['Total Revenue'].plot(kind = 'bar', color = 'orange')
plt.title('Total Revenue By Month')
plt.xlabel('Month')
plt.ylabel('Total Revenue')
plt.show()
```

```
<ipython-input-20-d208b96d1ed8>:1: FutureWarning: The default value of numeric_only in DataFrameGroupBy.sum is deprecated. In a future versio
n, numeric_only will default to False. Either specify numeric_only or select only columns which should be valid for the function.
  df.groupby('Order Month').sum()['Total Revenue'].plot(kind = 'bar', color = 'orange')
```

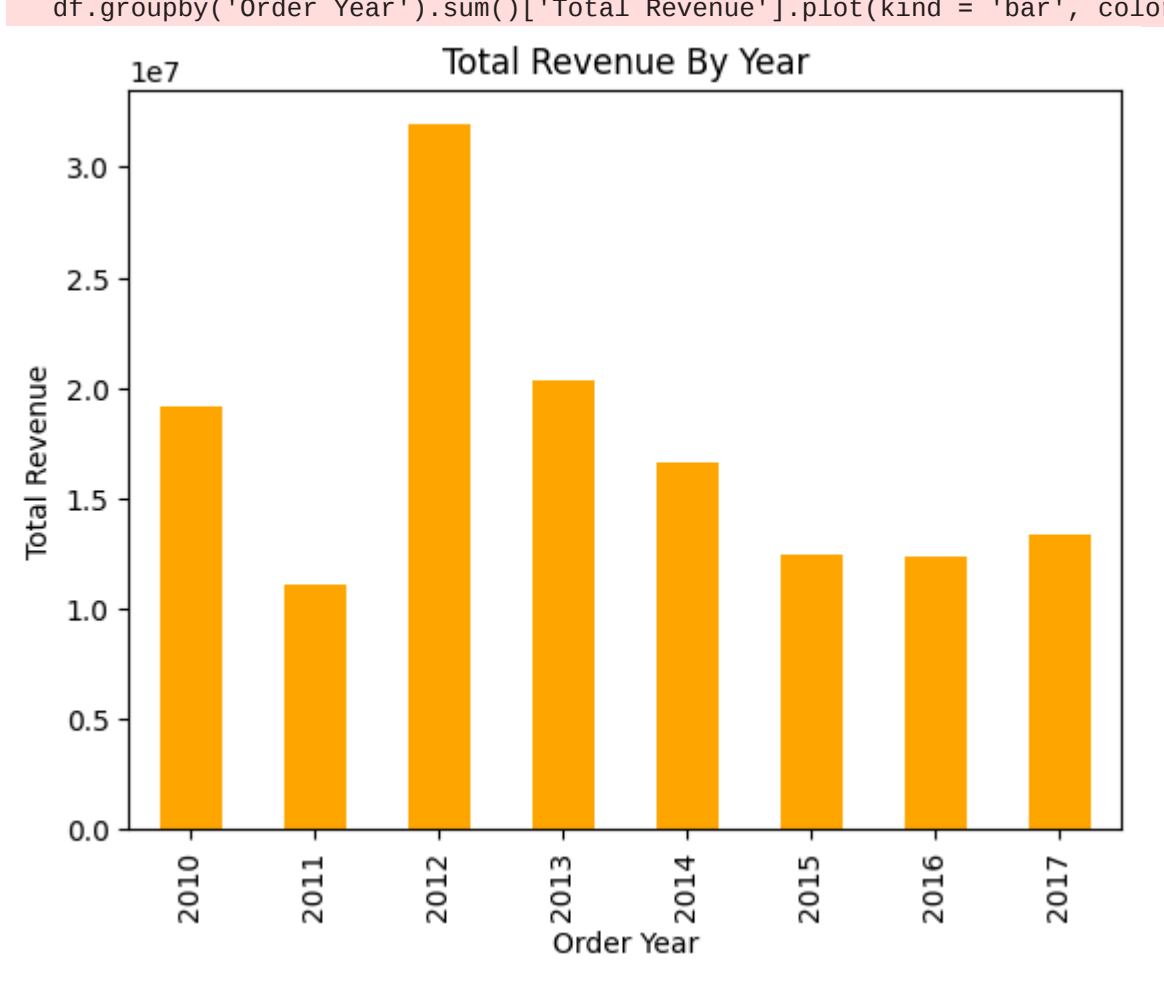


Year-wise Sales

In [21]:
```python
df['Order Year'] = df['Order Date'].dt.year
```

In [22]:
```python
df.groupby('Order Year').sum()['Total Revenue'].plot(kind = 'bar', color = 'orange')
plt.title('Total Revenue By Year')
plt.xlabel('Order Year')
plt.ylabel('Total Revenue')
plt.show()
```

```
<ipython-input-22-c6742b531681>:1: FutureWarning: The default value of numeric_only in DataFrameGroupBy.sum is deprecated. In a future versio
n, numeric_only will default to False. Either specify numeric_only or select only columns which should be valid for the function.
  df.groupby('Order Year').sum()['Total Revenue'].plot(kind = 'bar', color = 'orange')
```

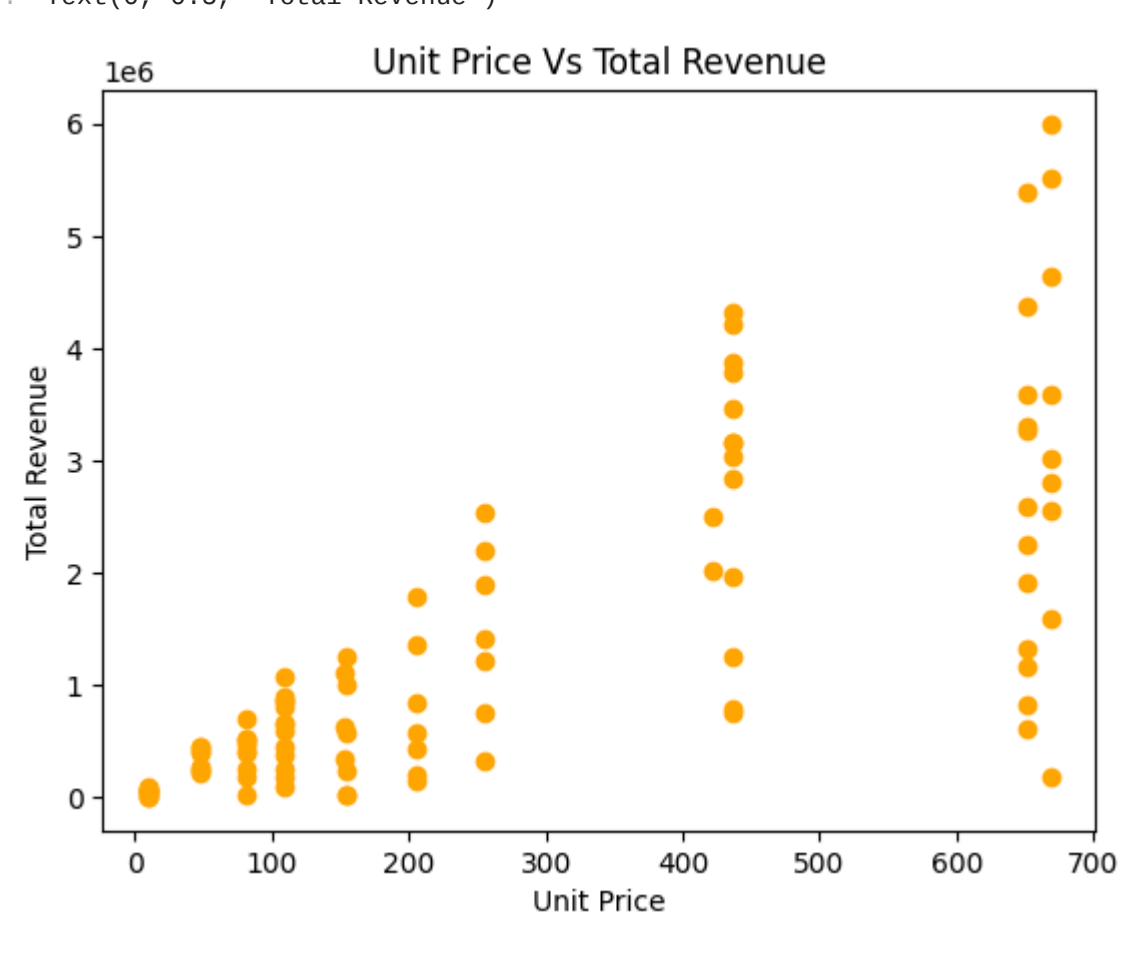


Relation between **Unit Price** and **Total Revenue**.

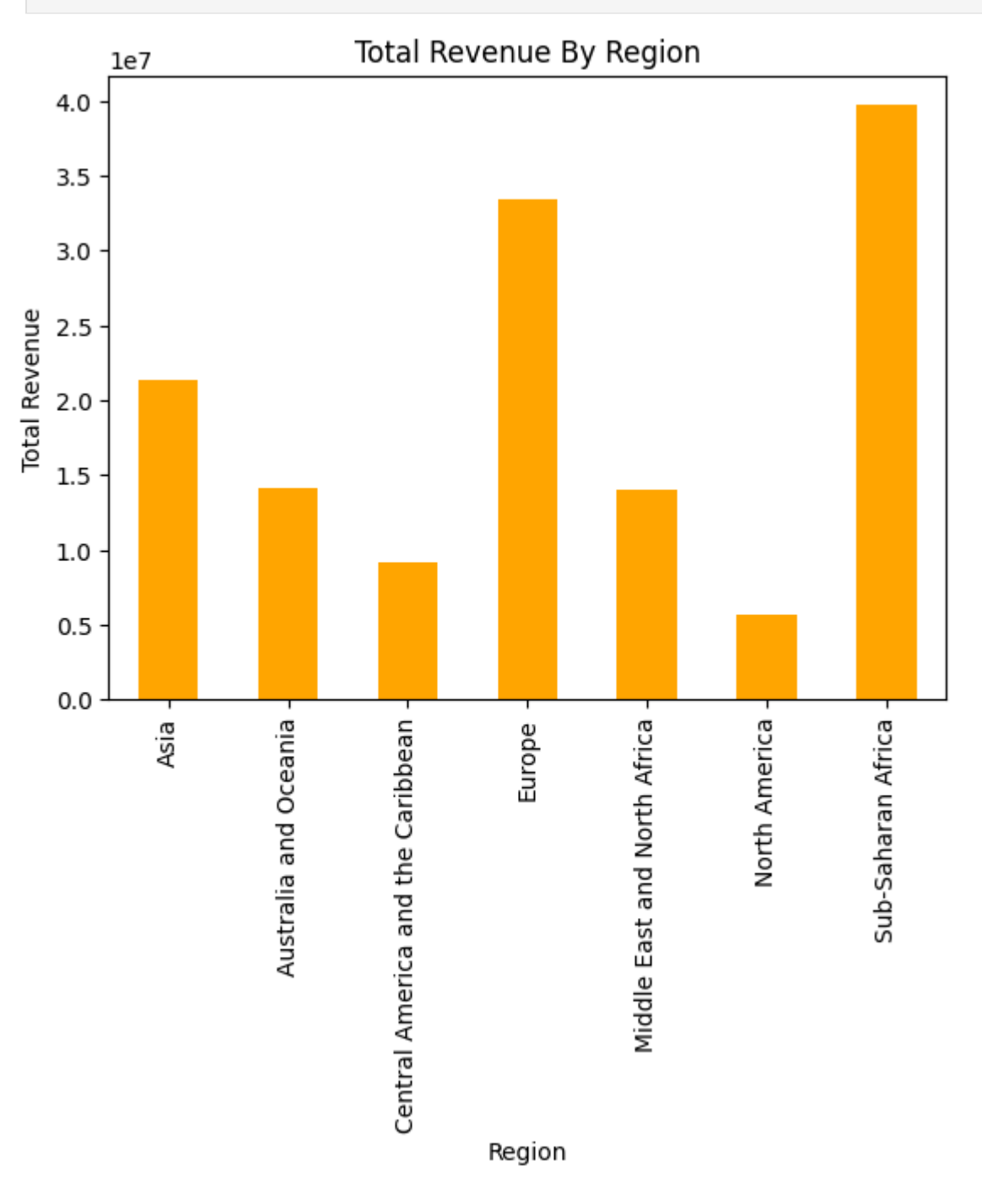
As **Unit Price** increases **Total Revenue** Increases.

In [23]:
```python
plt.scatter(df['Unit Price'],df['Total Revenue'],color = 'orange')
plt.title('Unit Price Vs Total Revenue')
plt.xlabel('Unit Price')
plt.ylabel('Total Revenue')
```

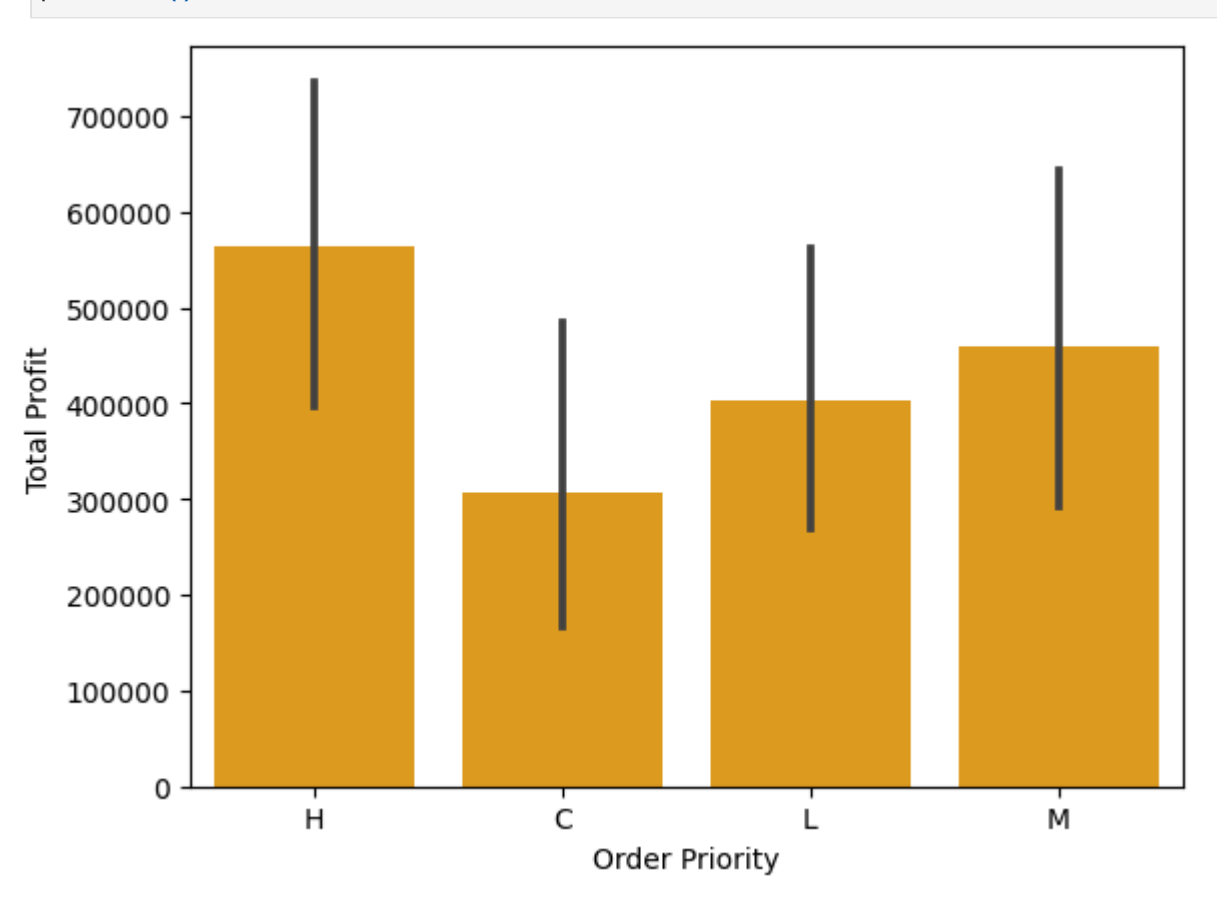
Out[23]: Text(0, 0.5, 'Total Revenue')



In [24]:
```python
df.groupby('Region')['Total Revenue'].sum().plot(kind = 'bar', color = 'orange')
plt.title('Total Revenue By Region')
plt.xlabel('Region')
plt.ylabel('Total Revenue')
plt.show()
```



In [25]:
```python
sns.barplot(x= 'Order Priority', y= 'Total Profit',color = 'orange', data =df)
plt.show()
```



Yearly-Month wise

In [26]:
```python
# yearly-month wise

Yearly_Monthwise = df.groupby(['Order Month','Order Year']).sum().reset_index()
Yearly_Monthwise.head()
```

```
<ipython-input-26-10f2b19d40b4>:3: FutureWarning: The default value of numeric_only in DataFrameGroupBy.sum is deprecated. In a future versio
n, numeric_only will default to False. Either specify numeric_only or select only columns which should be valid for the function.
  Yearly_Monthwise = df.groupby(['Order Month','Order Year']).sum().reset_index()
```

Out[26]:

	Order Month	Order Year	Order ID	Units Sold	Unit Price	Unit Cost	Total Revenue	Total Cost	Total Profit
0	1	2011	302867435	12914	200.03	129.23	1042225.35	678716.31	363509.04
1	1	2012	1792916511	1548	1319.48	1027.50	1012884.00	806315.64	206568.36
2	1	2015	177713572	8250	668.27	502.54	5513227.50	4145955.00	1367272.50
3	1	2017	1012615131	13030	531.17	400.53	2914130.27	2034623.15	879507.12
4	2	2010	767775368	9503	546.48	299.17	3410661.12	1986250.18	1424410.94

In [27]:
```python
sns.catplot(x ='Order Month', y = 'Total Profit', data = Yearly_Monthwise, kind = 'bar',color = 'orange', col = 'Order Year', col_wrap = 3)
```

Out[27]: <seaborn.axisgrid.FacetGrid at 0x7ff0f51dca60>