```
## Step 1 : Start by importing the libraries & 'Amazon Sales data.csv'

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")

pip install --upgrade nbconvert

Requirement already satisfied: nbconvert in c:\users\chetan\anaconda3\
lib\site-packages (7.16.4)
Requirement already satisfied: nbformat>=5.7 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (5.10.4)
Requirement already satisfied: jupyter-core>=4.7 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (5.7.2)
Requirement already satisfied: jinja2>=3.0 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (3.1.4)
Requirement already satisfied: markupsafe>=2.0 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (2.1.5)
Requirement already satisfied: tinycss2 in c:\users\chetan\anaconda3\
lib\site-packages (from nbconvert) (1.3.0)
Requirement already satisfied: pandocfilters>=1.4.1 in c:\users\
chetan\anaconda3\lib\site-packages (from nbconvert) (1.4.3)
Requirement already satisfied: jupyterlab-pygments in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (0.1.2)
Requirement already satisfied: mistune<4,>=2.0.3 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (3.0.2)
Requirement already satisfied: beautifulsoup4 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (4.10.0)
Requirement already satisfied: pygments>=2.4.1 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (2.10.0)
Requirement already satisfied: defusedxml in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (0.7.1)
Requirement already satisfied: importlib-metadata>=3.6 in c:\users\
chetan\anaconda3\lib\site-packages (from nbconvert) (4.8.1)
Requirement already satisfied: nbclient>=0.5.0 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (0.5.3)
Requirement already satisfied: traitlets>=5.1 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (5.14.3)
Requirement already satisfied: bleach!=5.0.0 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (4.0.0)
Requirement already satisfied: packaging in c:\users\chetan\anaconda3\
lib\site-packages (from nbconvert) (21.0)
Requirement already satisfied: webencodings in c:\users\chetan\
anaconda3\lib\site-packages (from bleach!=5.0.0->nbconvert) (0.5.1)
Requirement already satisfied: six>=1.9.0 in c:\users\chetan\
anaconda3\lib\site-packages (from bleach!=5.0.0->nbconvert) (1.16.0)
Requirement already satisfied: zipp>=0.5 in c:\users\chetan\anaconda3\
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lib\site-packages (from importlib-metadata>=3.6->nbconvert) (3.6.0)
Requirement already satisfied: platformdirs>=2.5 in c:\users\chetan\
anaconda3\lib\site-packages (from jupyter-core>=4.7->nbconvert)
(4.2.2)
Requirement already satisfied: pywin32>=300 in c:\users\chetan\
anaconda3\lib\site-packages (from jupyter-core>=4.7->nbconvert) (306)
Requirement already satisfied: nest-asyncio in c:\users\chetan\
anaconda3\lib\site-packages (from nbclient>=0.5.0->nbconvert) (1.5.1)
Requirement already satisfied: async-generator in c:\users\chetan\
anaconda3\lib\site-packages (from nbclient>=0.5.0->nbconvert) (1.10)
Requirement already satisfied: jupyter-client>=6.1.5 in c:\users\
chetan\anaconda3\lib\site-packages (from nbclient>=0.5.0->nbconvert)
(6.1.12)
Requirement already satisfied: pyzmq>=13 in c:\users\chetan\anaconda3\
lib\site-packages (from jupyter-client>=6.1.5->nbclient>=0.5.0-
>nbconvert) (22.2.1)
Requirement already satisfied: python-dateutil>=2.1 in c:\users\
chetan\anaconda3\lib\site-packages (from jupyter-client>=6.1.5-
>nbclient>=0.5.0->nbconvert) (2.8.2)
Requirement already satisfied: tornado>=4.1 in c:\users\chetan\
anaconda3\lib\site-packages (from jupyter-client>=6.1.5-
>nbclient>=0.5.0->nbconvert) (6.1)
Requirement already satisfied: jsonschema>=2.6 in c:\users\chetan\
anaconda3\lib\site-packages (from nbformat>=5.7->nbconvert) (3.2.0)
Requirement already satisfied: fastjsonschema>=2.15 in c:\users\
chetan\anaconda3\lib\site-packages (from nbformat>=5.7->nbconvert)
(2.20.0)
Requirement already satisfied: attrs>=17.4.0 in c:\users\chetan\
anaconda3\lib\site-packages (from jsonschema>=2.6->nbformat>=5.7-
>nbconvert) (21.2.0)
Requirement already satisfied: setuptools in c:\users\chetan\
anaconda3\lib\site-packages (from jsonschema>=2.6->nbformat>=5.7-
>nbconvert) (58.0.4)
Requirement already satisfied: pyrsistent>=0.14.0 in c:\users\chetan\
anaconda3\lib\site-packages (from jsonschema>=2.6->nbformat>=5.7-
>nbconvert) (0.18.0)
Requirement already satisfied: soupsieve>1.2 in c:\users\chetan\
anaconda3\lib\site-packages (from beautifulsoup4->nbconvert) (2.2.1)
Requirement already satisfied: pyparsing>=2.0.2 in c:\users\chetan\
anaconda3\lib\site-packages (from packaging->nbconvert) (3.0.4)
Note: you may need to restart the kernel to use updated packages.

pip install --upgrade nbconvert Jinja2

Requirement already satisfied: nbconvert in c:\users\chetan\anaconda3\
lib\site-packages (7.16.4)
Requirement already satisfied: Jinja2 in c:\users\chetan\anaconda3\
lib\site-packages (3.1.4)
Requirement already satisfied: jupyterlab-pygments in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (0.1.2)
```

```
Requirement already satisfied: pygments>=2.4.1 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (2.10.0)
Requirement already satisfied: nbclient>=0.5.0 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (0.5.3)
Requirement already satisfied: pandocfilters>=1.4.1 in c:\users\
chetan\anaconda3\lib\site-packages (from nbconvert) (1.4.3)
Requirement already satisfied: jupyter-core>=4.7 in c:\users\chetan\
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Requirement already satisfied: mistune<4,>=2.0.3 in c:\users\chetan\
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Requirement already satisfied: bleach!=5.0.0 in c:\users\chetan\
anaconda3\lib\site-packages (from nbconvert) (4.0.0)
Requirement already satisfied: packaging in c:\users\chetan\anaconda3\
lib\site-packages (from nbconvert) (21.0)
Requirement already satisfied: markupsafe>=2.0 in c:\users\chetan\
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Requirement already satisfied: jupyter-client>=6.1.5 in c:\users\
chetan\anaconda3\lib\site-packages (from nbclient>=0.5.0->nbconvert)
(6.1.12)
Requirement already satisfied: python-dateutil>=2.1 in c:\users\
chetan\anaconda3\lib\site-packages (from jupyter-client>=6.1.5-
>nbclient>=0.5.0->nbconvert) (2.8.2)
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>nbclient>=0.5.0->nbconvert) (6.1)
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lib\site-packages (from jupyter-client>=6.1.5->nbclient>=0.5.0-
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>nbconvert) (0.18.0)
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Requirement already satisfied: pyparsing>=2.0.2 in c:\users\chetan\
anaconda3\lib\site-packages (from packaging->nbconvert) (3.0.4)
Note: you may need to restart the kernel to use updated packages.
```

```
pd.set_option("display.max_columns",None)

pd.set_option("display.max_rows",None)

#Read the data in pandas
df= pd.read_csv("Amazon Sales data.csv ")

# Step 2 : Check the structure of the data - info,size,shape.

#Print the head of the data frame.
df.head()
```

```
                               Region                 Country
Item Type  \
0              Australia and Oceania                  Tuvalu
Baby Food
1  Central America and the Caribbean                 Grenada
Cereal
2                              Europe                  Russia  Office
Supplies
3                  Sub-Saharan Africa  Sao Tome and Principe
Fruits
4                  Sub-Saharan Africa                  Rwanda  Office
Supplies
```

```
  Sales Channel Order Priority Order Date   Order ID  Ship Date  Units
Sold  \
0       Offline              H  5/28/2010  669165933  6/27/2010
9925
1        Online              C  8/22/2012  963881480  9/15/2012
2804
2       Offline              L   5/2/2014  341417157   5/8/2014
1779
3        Online              C  6/20/2014  514321792   7/5/2014
8102
4       Offline              L   2/1/2013  115456712   2/6/2013
5062

   Unit Price  Unit Cost  Total Revenue  Total Cost  Total Profit
0      255.28     159.42     2533654.00  1582243.50     951410.50
1      205.70     117.11      576782.80   328376.44     248406.36
2      651.21     524.96     1158502.59   933903.84     224598.75
3        9.33       6.92       75591.66    56065.84      19525.82
4      651.21     524.96     3296425.02  2657347.52     639077.50
```

```
# Print the information about the attributes of inp0.
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
```

```
df.shape
```

```
(100, 14)
```

```
df.value_counts().sum()
```

```
100
```

```
# Step 3 : Data Quality Check and Missing values

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

```
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
```

```
# Step 4 : Split the "Order Year" column into "Order Quarter" & "Order
Month" for detailed analysis.
## Make a new data frame "inp1" which includes Order Quarter & Order
Month

df['Order Year'] = pd.DatetimeIndex(df['Order Date']).year
df['Order Quarter']= pd.DatetimeIndex(df['Order Date']).quarter
df['Order Month']= pd.DatetimeIndex(df['Order Date']).month

inp1= df[['Region' ,'Country', 'Item Type', 'Sales Channel', 'Order
Priority', 'Order Date', 'Order Year', 'Order Quarter',
          'Order Month','Order ID','Ship Date','Units Sold', 'Unit
Price', 'Unit Cost','Total Revenue','Total Cost','Total Profit']]

inp1
```

```
                               Region
Country  \
0               Australia and Oceania
Tuvalu
1   Central America and the Caribbean
Grenada
2                               Europe
Russia
3                  Sub-Saharan Africa             Sao Tome and
Principe
4                  Sub-Saharan Africa
Rwanda
5               Australia and Oceania                   Solomon
```

```
Islands
6                  Sub-Saharan Africa
Angola
7                  Sub-Saharan Africa                        Burkina
Faso
8                  Sub-Saharan Africa             Republic of the
Congo
9                  Sub-Saharan Africa
Senegal
10                               Asia
Kyrgyzstan
11                 Sub-Saharan Africa                          Cape
Verde
12                               Asia
Bangladesh
13  Central America and the Caribbean
Honduras
14                               Asia
Mongolia
15                            Europe
Bulgaria
16                               Asia                           Sri
Lanka
17                 Sub-Saharan Africa
Cameroon
18                               Asia
Turkmenistan
19              Australia and Oceania                          East
Timor
20                            Europe
Norway
21                            Europe
Portugal
22  Central America and the Caribbean
Honduras
23              Australia and Oceania                        New
Zealand
24                            Europe                           Moldova

25                            Europe
France
26              Australia and Oceania
Kiribati
27                 Sub-Saharan Africa
Mali
28                            Europe
Norway
29                 Sub-Saharan Africa                          The
Gambia
```

```
30                                Europe                                    
Switzerland
31                  Sub-Saharan Africa                           South      
Sudan
32               Australia and Oceania                                      
Australia
33                                  Asia                                     
Myanmar
34                  Sub-Saharan Africa                                      
Djibouti
35  Central America and the Caribbean                            Costa      
Rica
36       Middle East and North Africa                                       
Syria
37                  Sub-Saharan Africa                           The        
Gambia
38                                  Asia                                     
Brunei
39                                Europe                                     
Bulgaria
40                  Sub-Saharan Africa                                      
Niger
41       Middle East and North Africa                                       
Azerbaijan
42                  Sub-Saharan Africa                           The        
Gambia
43                                Europe                                     
Slovakia
44                                  Asia                                     
Myanmar
45                  Sub-Saharan Africa                                      
Comoros
46                                Europe                                     
Iceland
47                                Europe                                     
Switzerland
48                                Europe                                     
Macedonia
49                  Sub-Saharan Africa                                      
Mauritania
50                                Europe                                     
Albania
51                  Sub-Saharan Africa                                      
Lesotho
52       Middle East and North Africa                           Saudi      
Arabia
53                  Sub-Saharan Africa                           Sierra     
Leone
54                  Sub-Saharan Africa                Sao Tome and
```

```
Principe
55                  Sub-Saharan Africa                        Cote
d'Ivoire
56               Australia and Oceania
Fiji
57                               Europe
Austria
58                               Europe                      United
Kingdom
59                  Sub-Saharan Africa
Djibouti
60               Australia and Oceania
Australia
61                               Europe                           San
Marino
62                  Sub-Saharan Africa
Cameroon
63       Middle East and North Africa
Libya
64  Central America and the Caribbean
Haiti
65                  Sub-Saharan Africa
Rwanda
66                  Sub-Saharan Africa
Gabon
67  Central America and the Caribbean
Belize
68                               Europe
Lithuania
69                  Sub-Saharan Africa
Madagascar
70                                 Asia
Turkmenistan
71       Middle East and North Africa
Libya
72                  Sub-Saharan Africa  Democratic Republic of the
Congo
73                  Sub-Saharan Africa
Djibouti
74       Middle East and North Africa
Pakistan
75                        North America
Mexico
76               Australia and Oceania    Federated States of
Micronesia
77                                 Asia
Laos
78                               Europe
Monaco
```

```
79              Australia and Oceania                              Samoa

80                             Europe
Spain
81       Middle East and North Africa
Lebanon
82       Middle East and North Africa
Iran
83                 Sub-Saharan Africa
Zambia
84                 Sub-Saharan Africa
Kenya
85                       North America
Mexico
86                 Sub-Saharan Africa             Sao Tome and
Principe
87                 Sub-Saharan Africa                        The
Gambia
88       Middle East and North Africa
Kuwait
89                             Europe
Slovenia
90                 Sub-Saharan Africa                       Sierra
Leone
91              Australia and Oceania
Australia
92       Middle East and North Africa
Azerbaijan
93                             Europe
Romania
94  Central America and the Caribbean
Nicaragua
95                 Sub-Saharan Africa
Mali
96                               Asia
Malaysia
97                 Sub-Saharan Africa                       Sierra
Leone
98                       North America
Mexico
99                 Sub-Saharan Africa
Mozambique

          Item Type Sales Channel Order Priority  Order Date  Order
Year  \
0         Baby Food       Offline              H   5/28/2010
2010
1            Cereal        Online              C   8/22/2012
2012
```

```
2   Office Supplies       Offline              L    5/2/2014
2014
3            Fruits        Online              C   6/20/2014
2014
4   Office Supplies       Offline              L    2/1/2013
2013
5         Baby Food        Online              C    2/4/2015
2015
6         Household       Offline              M   4/23/2011
2011
7        Vegetables        Online              H   7/17/2012
2012
8     Personal Care       Offline              M   7/14/2015
2015
9            Cereal        Online              H   4/18/2014
2014
10       Vegetables        Online              H   6/24/2011
2011
11          Clothes       Offline              H    8/2/2014
2014
12          Clothes        Online              L   1/13/2017
2017
13        Household       Offline              H    2/8/2017
2017
14    Personal Care       Offline              C   2/19/2014
2014
15          Clothes        Online              M   4/23/2012
2012
16        Cosmetics       Offline              M  11/19/2016
2016
17        Beverages       Offline              C    4/1/2015
2015
18        Household       Offline              L  12/30/2010
2010
19             Meat        Online              L   7/31/2012
2012
20        Baby Food        Online              L   5/14/2014
2014
21        Baby Food        Online              H   7/31/2015
2015
22           Snacks        Online              L   6/30/2016
2016
23           Fruits        Online              H    9/8/2014
2014
24    Personal Care        Online              L    5/7/2016
2016
25        Cosmetics        Online              H   5/22/2017
2017
26           Fruits        Online              M  10/13/2014
```

```
2014
27           Fruits        Online              L    5/7/2010
2010
28        Beverages       Offline              C   7/18/2014
2014
29        Household       Offline              L   5/26/2012
2012
30        Cosmetics       Offline              M   9/17/2012
2012
31    Personal Care       Offline              C  12/29/2013
2013
32  Office Supplies        Online              C  10/27/2015
2015
33        Household       Offline              H   1/16/2015
2015
34           Snacks        Online              M   2/25/2017
2017
35    Personal Care       Offline              L    5/8/2017
2017
36           Fruits        Online              L  11/22/2011
2011
37             Meat        Online              M   1/14/2017
2017
38  Office Supplies        Online              L    4/1/2012
2012
39  Office Supplies        Online              M   2/16/2012
2012
40    Personal Care        Online              H   3/11/2017
2017
41        Cosmetics        Online              M    2/6/2010
2010
42           Cereal       Offline              H    6/7/2012
2012
43       Vegetables        Online              H   10/6/2012
2012
44          Clothes        Online              H  11/14/2015
2015
45           Cereal       Offline              H   3/29/2016
2016
46        Cosmetics        Online              C  12/31/2016
2016
47    Personal Care        Online              M  12/23/2010
2010
48          Clothes       Offline              C  10/14/2014
2014
49  Office Supplies       Offline              C   1/11/2012
2012
50          Clothes        Online              C    2/2/2010
2010
```

```
51           Fruits        Online              L   8/18/2013
2013
52           Cereal        Online              M   3/25/2013
2013
53  Office Supplies       Offline              M  11/26/2011
2011
54           Fruits        Offline             H   9/17/2013
2013
55          Clothes        Online              C    6/8/2012
2012
56          Clothes       Offline              C   6/30/2010
2010
57        Cosmetics       Offline              H   2/23/2015
2015
58        Household        Online              L    1/5/2012
2012
59        Cosmetics       Offline              H    4/7/2014
2014
60           Cereal       Offline              H    6/9/2013
2013
61        Baby Food        Online              L   6/26/2013
2013
62  Office Supplies        Online              M   11/7/2011
2011
63          Clothes       Offline              H  10/30/2010
2010
64        Cosmetics       Offline              H  10/13/2013
2013
65        Cosmetics       Offline              H  10/11/2013
2013
66    Personal Care       Offline              L    7/8/2012
2012
67          Clothes       Offline              M   7/25/2016
2016
68  Office Supplies       Offline              H  10/24/2010
2010
69          Clothes       Offline              L   4/25/2015
2015
70  Office Supplies        Online              M   4/23/2013
2013
71           Fruits        Online              L   8/14/2015
2015
72        Beverages        Online              C   5/26/2011
2011
73           Cereal        Online              H   5/20/2017
2017
74        Cosmetics       Offline              L    7/5/2013
2013
75        Household       Offline              C   11/6/2014
```

```
2014
76        Beverages        Online              C  10/28/2014
2014
77       Vegetables       Offline              C   9/15/2011
2011
78        Baby Food       Offline              H   5/29/2012
2012
79        Cosmetics        Online              H   7/20/2013
2013
80        Household       Offline              L  10/21/2012
2012
81          Clothes        Online              L   9/18/2012
2012
82        Cosmetics        Online              H  11/15/2016
2016
83           Snacks        Online              L    1/4/2011
2011
84       Vegetables        Online              L   3/18/2012
2012
85    Personal Care       Offline              L   2/17/2012
2012
86        Beverages       Offline              C   1/16/2011
2011
87        Baby Food       Offline              M    2/3/2014
2014
88           Fruits        Online              M   4/30/2012
2012
89        Beverages       Offline              C  10/23/2016
2016
90  Office Supplies       Offline              H   12/6/2016
2016
91        Beverages       Offline              H    7/7/2014
2014
92  Office Supplies        Online              M   6/13/2012
2012
93        Cosmetics        Online              H  11/26/2010
2010
94        Beverages       Offline              C    2/8/2011
2011
95          Clothes        Online              M   7/26/2011
2011
96           Fruits       Offline              L  11/11/2011
2011
97       Vegetables       Offline              C    6/1/2016
2016
98    Personal Care       Offline              M   7/30/2015
2015
99        Household       Offline              L   2/10/2012
2012
```

	Order Quarter	Order Month	Order ID	Ship Date	Units Sold	Unit Price
0	2	5	669165933	6/27/2010	9925	255.28
1	3	8	963881480	9/15/2012	2804	205.70
2	2	5	341417157	5/8/2014	1779	651.21
3	2	6	514321792	7/5/2014	8102	9.33
4	1	2	115456712	2/6/2013	5062	651.21
5	1	2	547995746	2/21/2015	2974	255.28
6	2	4	135425221	4/27/2011	4187	668.27
7	3	7	871543967	7/27/2012	8082	154.06
8	3	7	770463311	8/25/2015	6070	81.73
9	2	4	616607081	5/30/2014	6593	205.70
10	2	6	814711606	7/12/2011	124	154.06
11	3	8	939825713	8/19/2014	4168	109.28
12	1	1	187310731	3/1/2017	8263	109.28
13	1	2	522840487	2/13/2017	8974	668.27
14	1	2	832401311	2/23/2014	4901	81.73
15	2	4	972292029	6/3/2012	1673	109.28
16	4	11	419123971	12/18/2016	6952	437.20
17	2	4	519820964	4/18/2015	5430	47.45
18	4	12	441619336	1/20/2011	3830	668.27
19	3	7	322067916	9/11/2012	5908	421.89
20	2	5	819028031	6/28/2014	7450	255.28
21	3	7	860673511	9/3/2015	1273	255.28
22	2	6	795490682	7/26/2016	2225	152.58

23	3	9	142278373	10/4/2014	2187	9.33
24	2	5	740147912	5/10/2016	5070	81.73
25	2	5	898523128	6/5/2017	1815	437.20
26	4	10	347140347	11/10/2014	5398	9.33
27	2	5	686048400	5/10/2010	5822	9.33
28	3	7	435608613	7/30/2014	5124	47.45
29	2	5	886494815	6/9/2012	2370	668.27
30	3	9	249693334	10/20/2012	8661	437.20
31	4	12	406502997	1/28/2014	2125	81.73
32	4	10	158535134	11/25/2015	2924	651.21
33	1	1	177713572	3/1/2015	8250	668.27
34	1	2	756274640	2/25/2017	7327	152.58
35	2	5	456767165	5/21/2017	6409	81.73
36	4	11	162052476	12/3/2011	3784	9.33
37	1	1	825304400	1/23/2017	4767	421.89
38	2	4	320009267	5/8/2012	6708	651.21
39	1	2	189965903	2/28/2012	3987	651.21
40	1	3	699285638	3/28/2017	3015	81.73
41	1	2	382392299	2/25/2010	7234	437.20
42	2	6	994022214	6/8/2012	2117	205.70
43	4	10	759224212	11/10/2012	171	154.06
44	4	11	223359620	11/18/2015	5930	109.28
45	1	3	902102267	4/29/2016	962	205.70
46	4	12	331438481	12/31/2016	8867	437.20
47	4	12	617667090	1/31/2011	273	81.73

48	4	10	787399423	11/14/2014	7842	109.28
49	1	1	837559306	1/13/2012	1266	651.21
50	1	2	385383069	3/18/2010	2269	109.28
51	3	8	918419539	9/18/2013	9606	9.33
52	1	3	844530045	3/28/2013	4063	205.70
53	4	11	441888415	1/7/2012	3457	651.21
54	3	9	508980977	10/24/2013	7637	9.33
55	2	6	114606559	6/27/2012	3482	109.28
56	2	6	647876489	8/1/2010	9905	109.28
57	1	2	868214595	3/2/2015	2847	437.20
58	1	1	955357205	2/14/2012	282	668.27
59	2	4	259353148	4/19/2014	7215	437.20
60	2	6	450563752	7/2/2013	682	205.70
61	2	6	569662845	7/1/2013	4750	255.28
62	4	11	177636754	11/15/2011	5518	651.21
63	4	10	705784308	11/17/2010	6116	109.28
64	4	10	505716836	11/16/2013	1705	437.20
65	4	10	699358165	11/25/2013	4477	437.20
66	3	7	228944623	7/9/2012	8656	81.73
67	3	7	807025039	9/7/2016	5498	109.28
68	4	10	166460740	11/17/2010	8287	651.21
69	2	4	610425555	5/28/2015	7342	109.28
70	2	4	462405812	5/20/2013	5010	651.21
71	3	8	816200339	9/30/2015	673	9.33
72	2	5	585920464	7/15/2011	5741	

```
47.45
73              2            5  555990016   6/17/2017        8656
205.70
74              3            7  231145322   8/16/2013        9892
437.20
75              4           11  986435210  12/12/2014        6954
668.27
76              4           10  217221009  11/15/2014        9379
47.45
77              3            9  789176547  10/23/2011        3732
154.06
78              2            5  688288152    6/2/2012        8614
255.28
79              3            7  670854651    8/7/2013        9654
437.20
80              4           10  213487374  11/30/2012        4513
668.27
81              3            9  663110148   10/8/2012        7884
109.28
82              4           11  286959302   12/8/2016        6489
437.20
83              1            1  122583663    1/5/2011        4085
152.58
84              1            3  827844560    4/7/2012        6457
154.06
85              1            2  430915820   3/20/2012        6422
81.73
86              1            1  180283772   1/21/2011        8829
47.45
87              1            2  494747245   3/20/2014        5559
255.28
88              2            4  513417565   5/18/2012         522
9.33
89              4           10  345718562  11/25/2016        4660
47.45
90              4           12  621386563  12/14/2016         948
651.21
91              3            7  240470397   7/11/2014        9389
47.45
92              2            6  423331391   7/24/2012        2021
651.21
93              4           11  660643374  12/25/2010        7910
437.20
94              1            2  963392674   3/21/2011        8156
47.45
95              3            7  512878119    9/3/2011         888
109.28
96              4           11  810711038  12/28/2011        6267
9.33
```

```
97               2            6  728815257   6/29/2016         1485
154.06
98               3            7  559427106    8/8/2015         5767
81.73
99               1            2  665095412   2/15/2012         5367
668.27
```

	Unit Cost	Total Revenue	Total Cost	Total Profit
0	159.42	2533654.00	1582243.50	951410.50
1	117.11	576782.80	328376.44	248406.36
2	524.96	1158502.59	933903.84	224598.75
3	6.92	75591.66	56065.84	19525.82
4	524.96	3296425.02	2657347.52	639077.50
5	159.42	759202.72	474115.08	285087.64
6	502.54	2798046.49	2104134.98	693911.51
7	90.93	1245112.92	734896.26	510216.66
8	56.67	496101.10	343986.90	152114.20
9	117.11	1356180.10	772106.23	584073.87
10	90.93	19103.44	11275.32	7828.12
11	35.84	455479.04	149381.12	306097.92
12	35.84	902980.64	296145.92	606834.72
13	502.54	5997054.98	4509793.96	1487261.02
14	56.67	400558.73	277739.67	122819.06
15	35.84	182825.44	59960.32	122865.12
16	263.33	3039414.40	1830670.16	1208744.24
17	31.79	257653.50	172619.70	85033.80
18	502.54	2559474.10	1924728.20	634745.90
19	364.69	2492526.12	2154588.52	337937.60
20	159.42	1901836.00	1187679.00	714157.00
21	159.42	324971.44	202941.66	122029.78
22	97.44	339490.50	216804.00	122686.50
23	6.92	20404.71	15134.04	5270.67
24	56.67	414371.10	287316.90	127054.20
25	263.33	793518.00	477943.95	315574.05
26	6.92	50363.34	37354.16	13009.18
27	6.92	54319.26	40288.24	14031.02
28	31.79	243133.80	162891.96	80241.84
29	502.54	1583799.90	1191019.80	392780.10
30	263.33	3786589.20	2280701.13	1505888.07
31	56.67	173676.25	120423.75	53252.50
32	524.96	1904138.04	1534983.04	369155.00
33	502.54	5513227.50	4145955.00	1367272.50
34	97.44	1117953.66	713942.88	404010.78
35	56.67	523807.57	363198.03	160609.54
36	6.92	35304.72	26185.28	9119.44
37	364.69	2011149.63	1738477.23	272672.40
38	524.96	4368316.68	3521431.68	846885.00
39	524.96	2596374.27	2093015.52	503358.75
40	56.67	246415.95	170860.05	75555.90

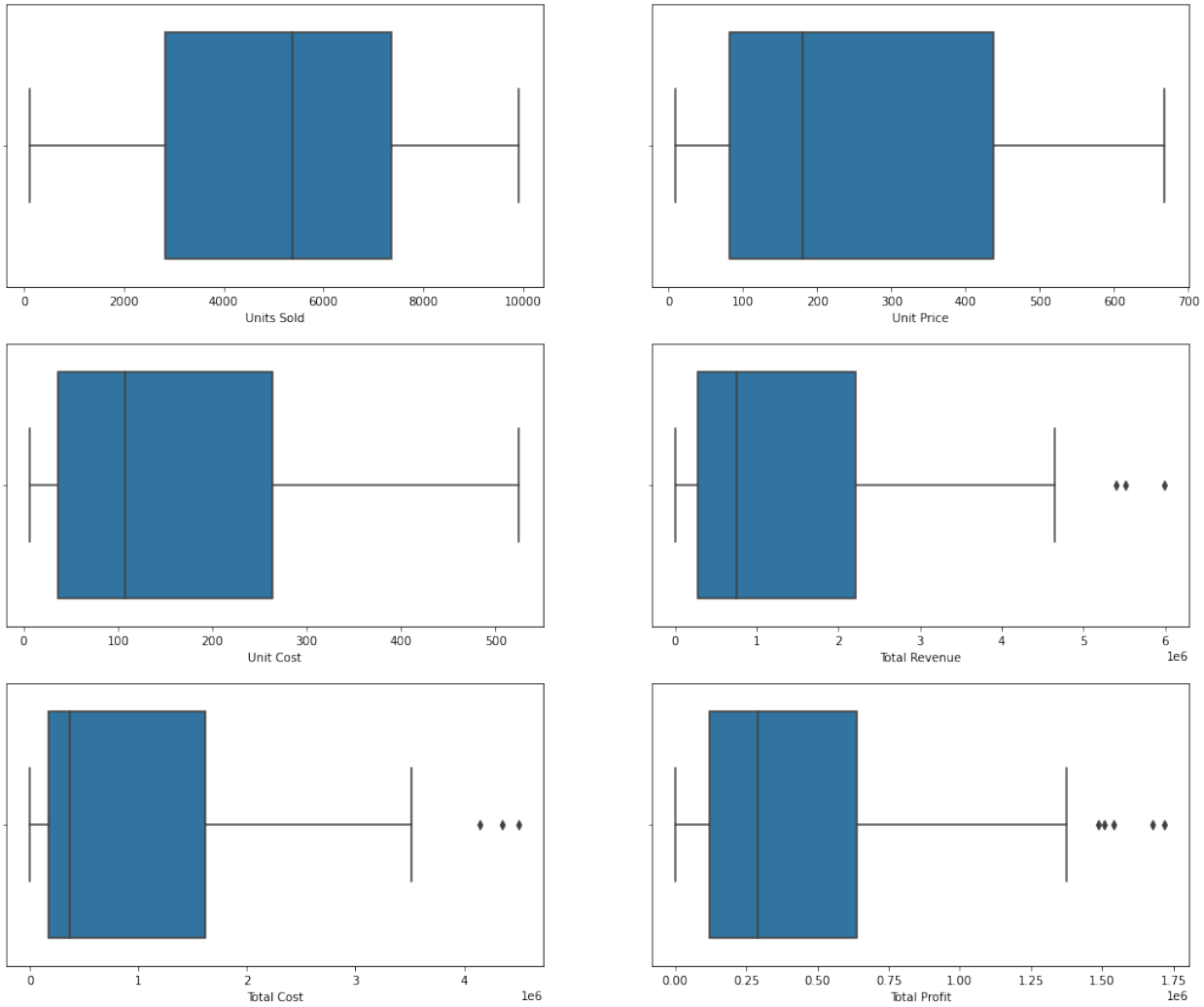
41	263.33	3162704.80	1904929.22	1257775.58
42	117.11	435466.90	247921.87	187545.03
43	90.93	26344.26	15549.03	10795.23
44	35.84	648030.40	212531.20	435499.20
45	117.11	197883.40	112659.82	85223.58
46	263.33	3876652.40	2334947.11	1541705.29
47	56.67	22312.29	15470.91	6841.38
48	35.84	856973.76	281057.28	575916.48
49	524.96	824431.86	664599.36	159832.50
50	35.84	247956.32	81320.96	166635.36
51	6.92	89623.98	66473.52	23150.46
52	117.11	835759.10	475817.93	359941.17
53	524.96	2251232.97	1814786.72	436446.25
54	6.92	71253.21	52848.04	18405.17
55	35.84	380512.96	124794.88	255718.08
56	35.84	1082418.40	354995.20	727423.20
57	263.33	1244708.40	749700.51	495007.89
58	502.54	188452.14	141716.28	46735.86
59	263.33	3154398.00	1899925.95	1254472.05
60	117.11	140287.40	79869.02	60418.38
61	159.42	1212580.00	757245.00	455335.00
62	524.96	3593376.78	2896729.28	696647.50
63	35.84	668356.48	219197.44	449159.04
64	263.33	745426.00	448977.65	296448.35
65	263.33	1957344.40	1178928.41	778415.99
66	56.67	707454.88	490535.52	216919.36
67	35.84	600821.44	197048.32	403773.12
68	524.96	5396577.27	4350343.52	1046233.75
69	35.84	802333.76	263137.28	539196.48
70	524.96	3262562.10	2630049.60	632512.50
71	6.92	6279.09	4657.16	1621.93
72	31.79	272410.45	182506.39	89904.06
73	117.11	1780539.20	1013704.16	766835.04
74	263.33	4324782.40	2604860.36	1719922.04
75	502.54	4647149.58	3494663.16	1152486.42
76	31.79	445033.55	298158.41	146875.14
77	90.93	574951.92	339350.76	235601.16
78	159.42	2198981.92	1373243.88	825738.04
79	263.33	4220728.80	2542187.82	1678540.98
80	502.54	3015902.51	2267963.02	747939.49
81	35.84	861563.52	282562.56	579000.96
82	263.33	2836990.80	1708748.37	1128242.43
83	97.44	623289.30	398042.40	225246.90
84	90.93	994765.42	587135.01	407630.41
85	56.67	524870.06	363934.74	160935.32
86	31.79	418936.05	280673.91	138262.14
87	159.42	1419101.52	886215.78	532885.74
88	6.92	4870.26	3612.24	1258.02
89	31.79	221117.00	148141.40	72975.60

```
90     524.96      617347.08   497662.08     119685.00
91      31.79      445508.05   298476.31     147031.74
92     524.96     1316095.41  1060944.16     255151.25
93     263.33     3458252.00  2082940.30    1375311.70
94      31.79      387002.20   259279.24     127722.96
95      35.84       97040.64    31825.92      65214.72
96       6.92       58471.11    43367.64      15103.47
97      90.93      228779.10   135031.05      93748.05
98      56.67      471336.91   326815.89     144521.02
99     502.54     3586605.09  2697132.18     889472.91
```

```
# Visualization of Numerical variables Distribution

fig, axes = plt.subplots(3,2, figsize=(18,15))
fig.suptitle('Distribution of Numerical Variables \n', fontsize=26);


# Units Sold
sns.boxplot(x='Units Sold', data = inp1, ax=axes[0,0])

# Unit Price
sns.boxplot(x='Unit Price', data = inp1, ax=axes[0,1])

# Unit Cost
sns.boxplot(x='Unit Cost', data = inp1, ax=axes[1,0])

# Total revenue
sns.boxplot(x='Total Revenue', data = inp1, ax=axes[1,1])

# Total Cost
sns.boxplot(x='Total Cost', data = inp1, ax=axes[2,0])

# Total Profit
sns.boxplot(x='Total Profit', data = inp1, ax=axes[2,1])
```

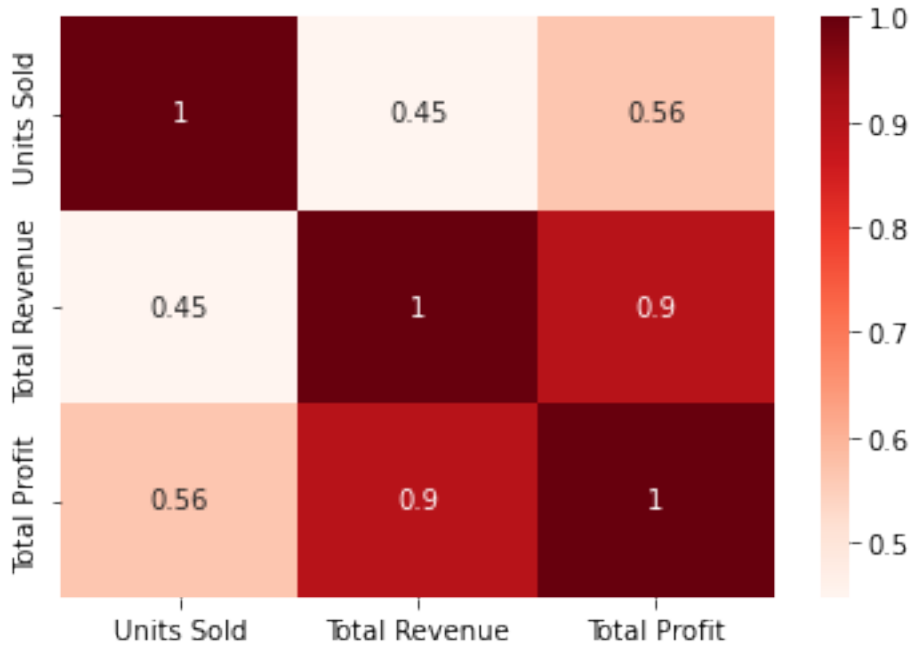
```
<AxesSubplot:xlabel='Total Profit'>
```

Distribution of Numerical Variables




```
# Units Sold : No presence of outliers. The number of units sold range
between 124 - 9925 units with a mean of 5129 units sold.
# Unit Price : No presence of outliers. The unit price ranges between
9 - 668  with a mean value of 277.
# Unit Cost : Presence of outliers. The unit cost ranges between 7 -
525 with a mean value of 191.
# Total Revenue : Presence of outliers. The total revenue ranges
between 4870 - 6 million with a mean value of 1.37 million.
# Total Cost : Presence of outliers. The total cost ranges between
3612 - 4.5 million with a mean value of 931805.
# Total Profit : Presence of outliers. The total profit ranges between
1258 - 1.7 million  with a mean value of 441682.
```

```
sns.heatmap(df[['Units Sold','Total Revenue','Total
Profit']].corr(),annot=True,cmap='Reds')
plt.show()
```




```
#  variable 'Units Sold' & 'Total Revenue' variable are highly
correlated.

inp1['Units Sold'].describe()
```

```
count     100.000000
mean     5128.710000
std      2794.484562
min       124.000000
25%      2836.250000
50%      5382.500000
75%      7369.000000
max      9925.000000
Name: Units Sold, dtype: float64
```

```
inp1['Unit Price'].describe()
```

```
count    100.000000
mean     276.761300
std      235.592241
min        9.330000
25%       81.730000
50%      179.880000
75%      437.200000
```

```
max      668.270000
Name: Unit Price, dtype: float64
```

```
inp1['Unit Cost'].describe()
```

```
count    100.000000
mean     191.048000
std      188.208181
min        6.920000
25%       35.840000
50%      107.275000
75%      263.330000
max      524.960000
Name: Unit Cost, dtype: float64
```

```
inp1['Total Revenue'].describe()
```

```
count    1.000000e+02
mean     1.373488e+06
std      1.460029e+06
min      4.870260e+03
25%      2.687212e+05
50%      7.523144e+05
75%      2.212045e+06
max      5.997055e+06
Name: Total Revenue, dtype: float64
```

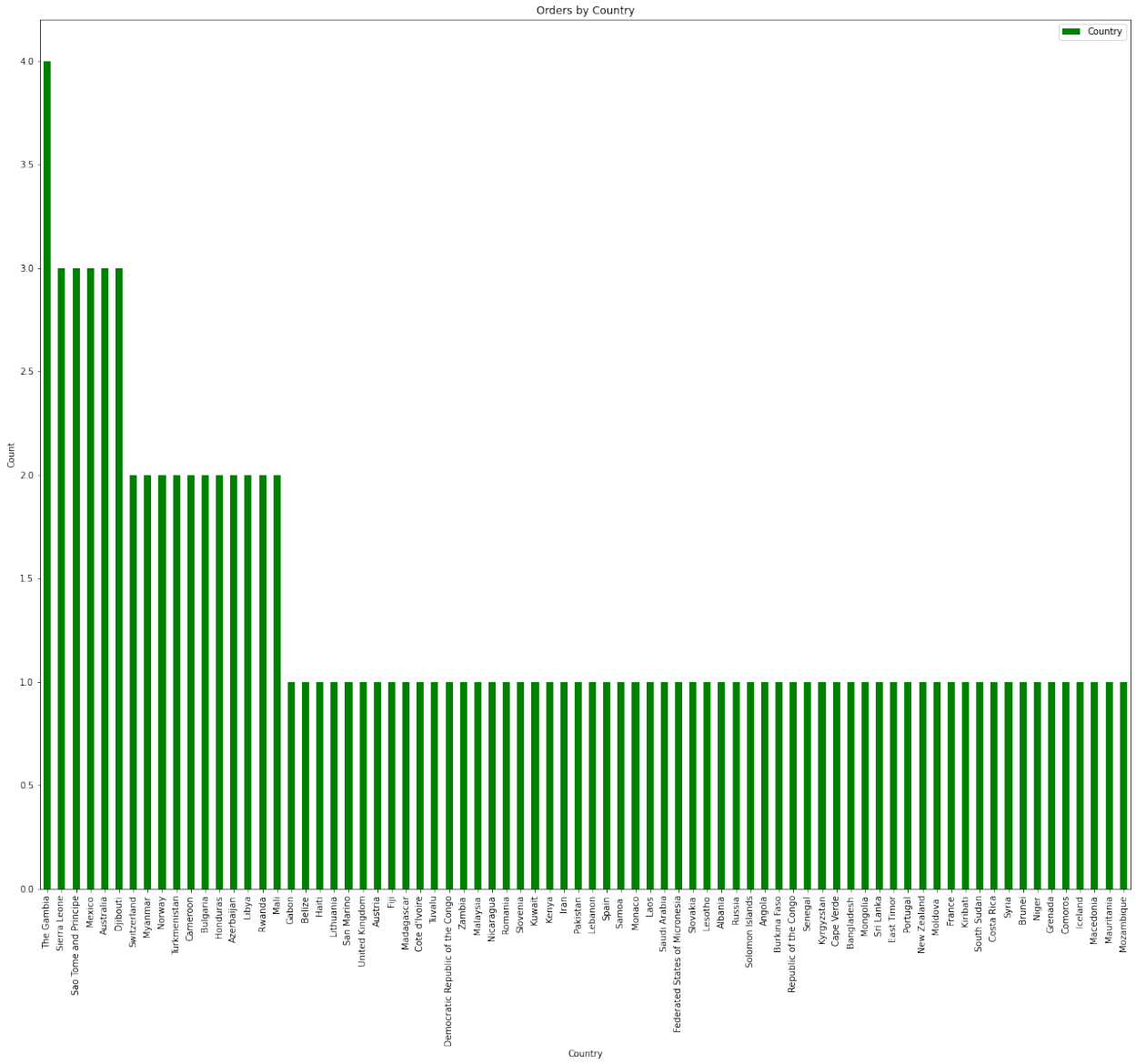
```
inp1['Total Cost'].describe()
```

```
count    1.000000e+02
mean     9.318057e+05
std      1.083938e+06
min      3.612240e+03
25%      1.688680e+05
50%      3.635664e+05
75%      1.613870e+06
max      4.509794e+06
Name: Total Cost, dtype: float64
```

```
inp1['Total Profit'].describe()
```

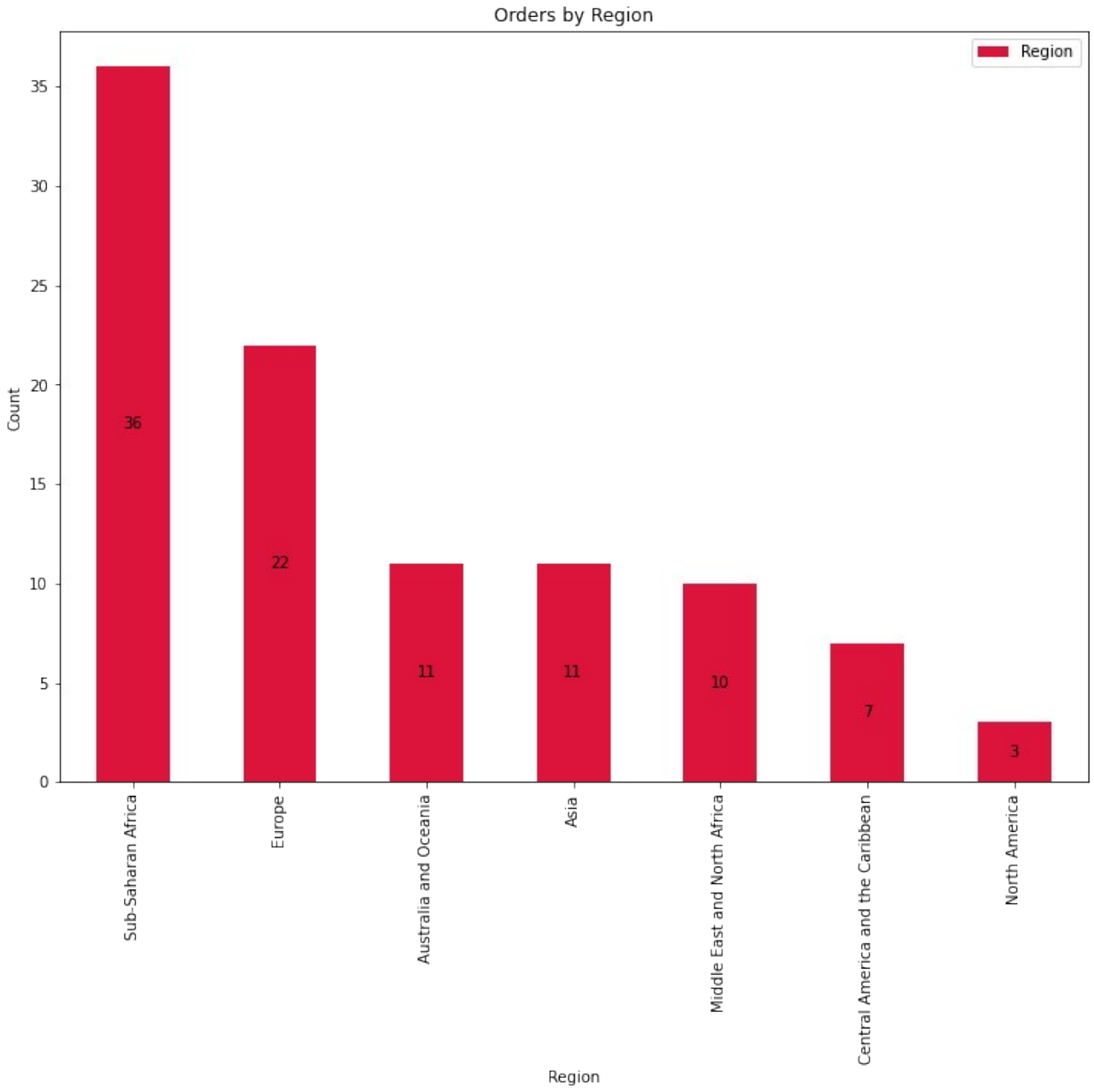
```
count    1.000000e+02
mean     4.416820e+05
std      4.385379e+05
min      1.258020e+03
25%      1.214436e+05
50%      2.907680e+05
75%      6.358288e+05
max      1.719922e+06
Name: Total Profit, dtype: float64
```

```
df = inp1['Country'].value_counts()

fig, ax = plt.subplots(figsize=(22, 18))
df.plot(kind='bar',color=['green'],ax=ax)
plt.title('Orders by Country')
plt.xlabel('Country')
plt.ylabel('Count')
plt.legend(loc='upper right');
```



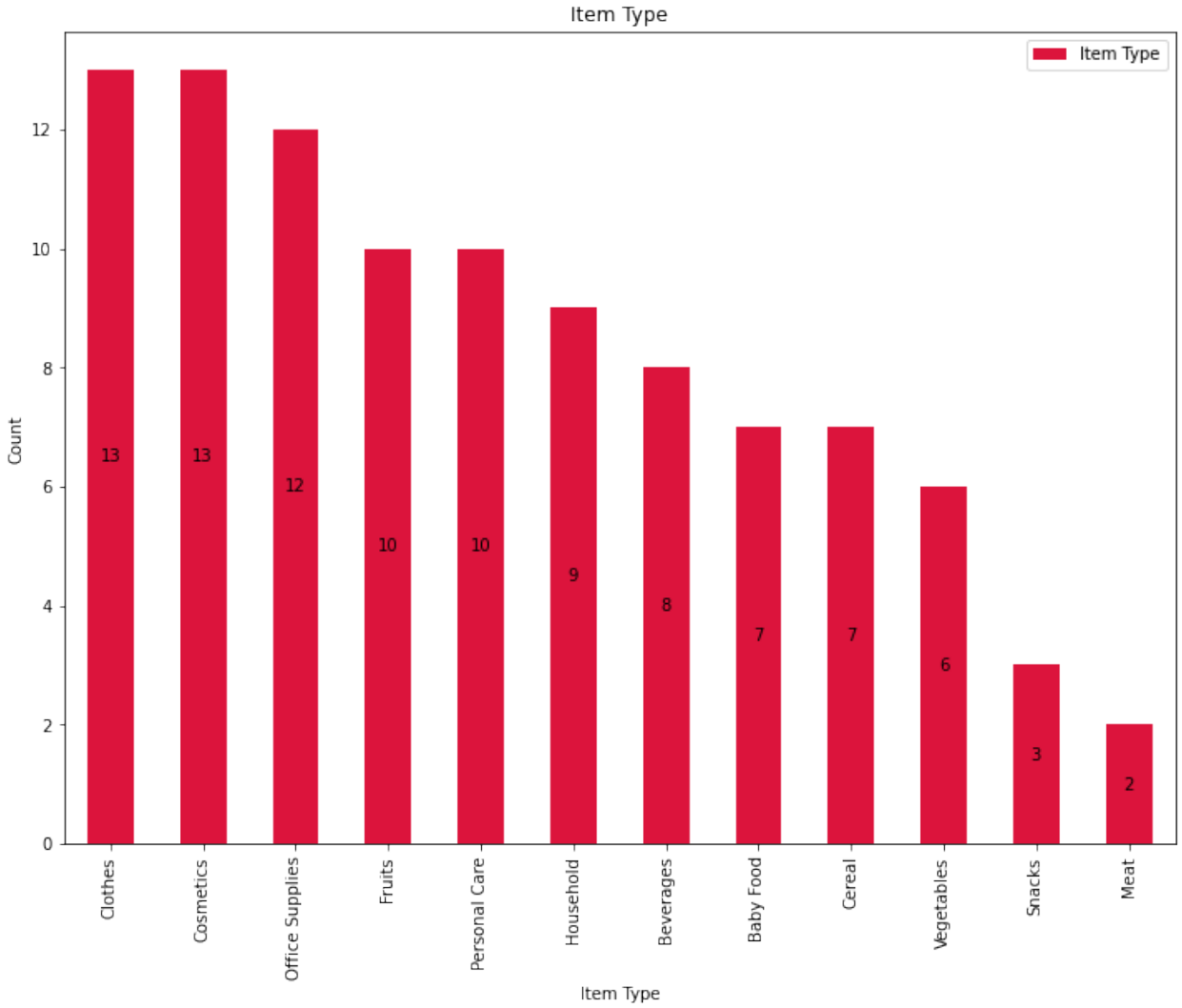

```
df = inp1['Region'].value_counts()

fig, ax = plt.subplots(figsize=(12, 9))
df.plot(kind='bar',color=['crimson'],ax=ax)
plt.title('Orders by Region')
```

```
plt.xlabel('Region')
plt.ylabel('Count')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```



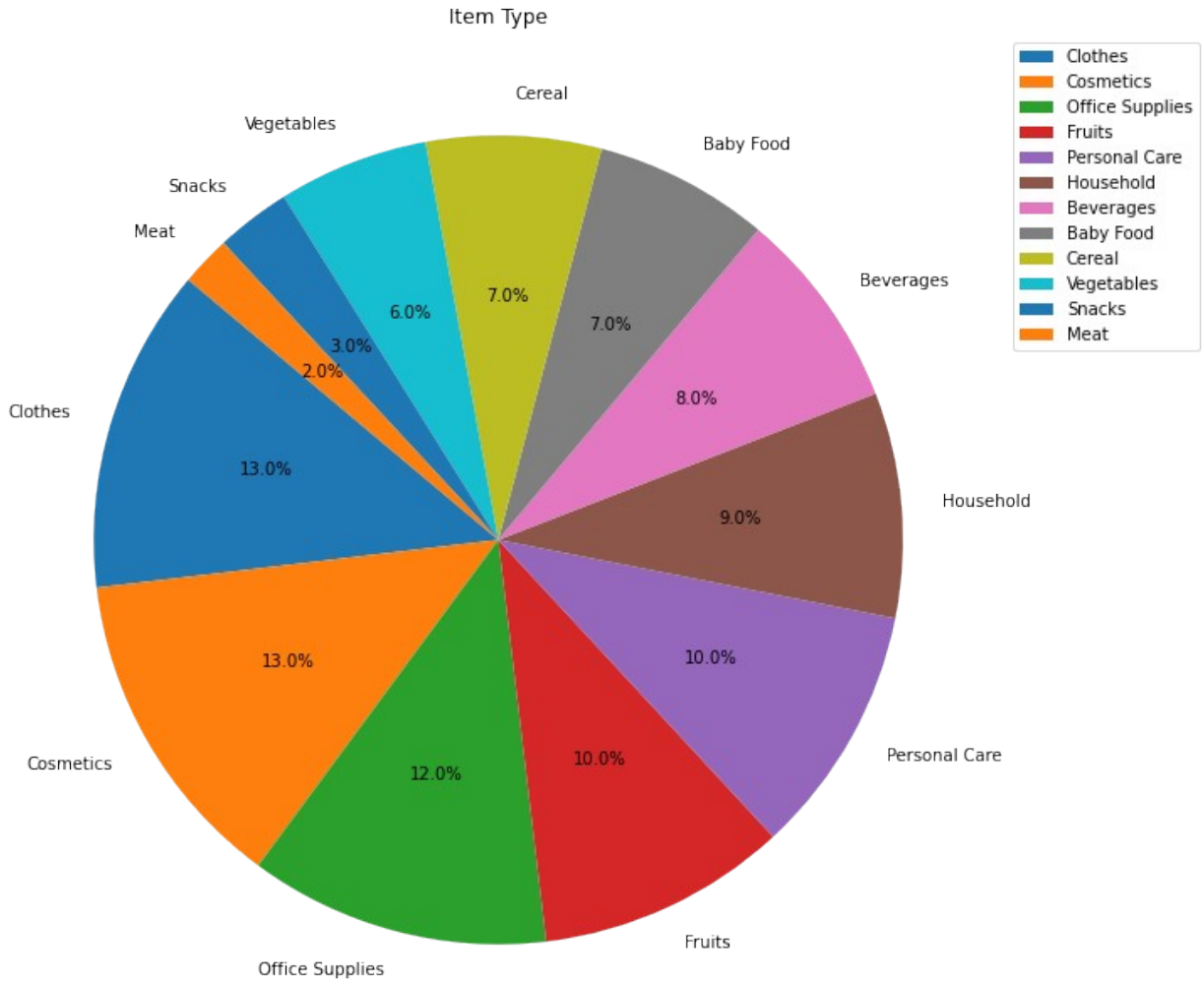

```
# Region Sub-Saharan Africa has the maximum number of orders '36'
followed by Europe '22'.

df = inp1['Item Type'].value_counts()
```

```
fig, ax = plt.subplots(figsize=(12, 9))
df.plot(kind='bar',color=['crimson'],ax=ax)
plt.title('Item Type')
plt.xlabel('Item Type')
plt.ylabel('Count')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```




```
# Item type 'Clothes' & 'Cosmetics' with 13 each were the most ordered
across all regions and years.

df = inp1['Item Type'].value_counts(normalize=True)*100
```

```
fig, ax = plt.subplots(figsize=(12, 9))
df.plot(kind='pie',ax=ax,autopct='%1.1f%%', startangle=140)
plt.title('Item Type')
plt.ylabel('')
plt.legend(loc='upper left', bbox_to_anchor=(1, 1))
plt.tight_layout(rect=[0, 0, 0.75, 1]);
```

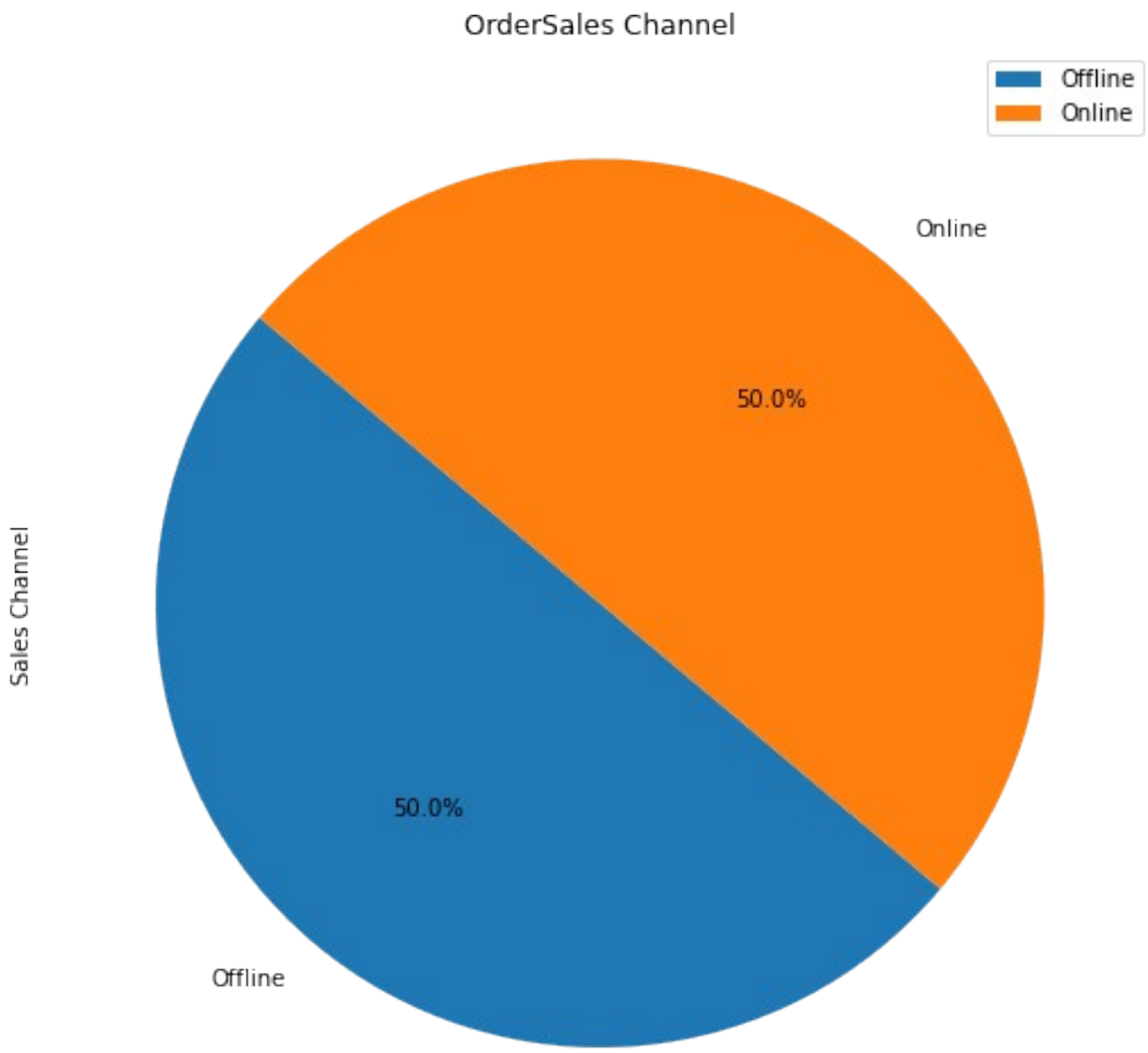



```
df = inp1['Sales Channel'].value_counts(normalize=True)*100
print(df)
```

```
Offline    50.0
Online     50.0
Name: Sales Channel, dtype: float64
```

```
fig, ax = plt.subplots(figsize=(12, 9))
df.plot(kind='pie',ax=ax,autopct='%1.1f%%', startangle=140)
```

```
plt.title('OrderSales Channel')
plt.legend(loc='upper right');
```

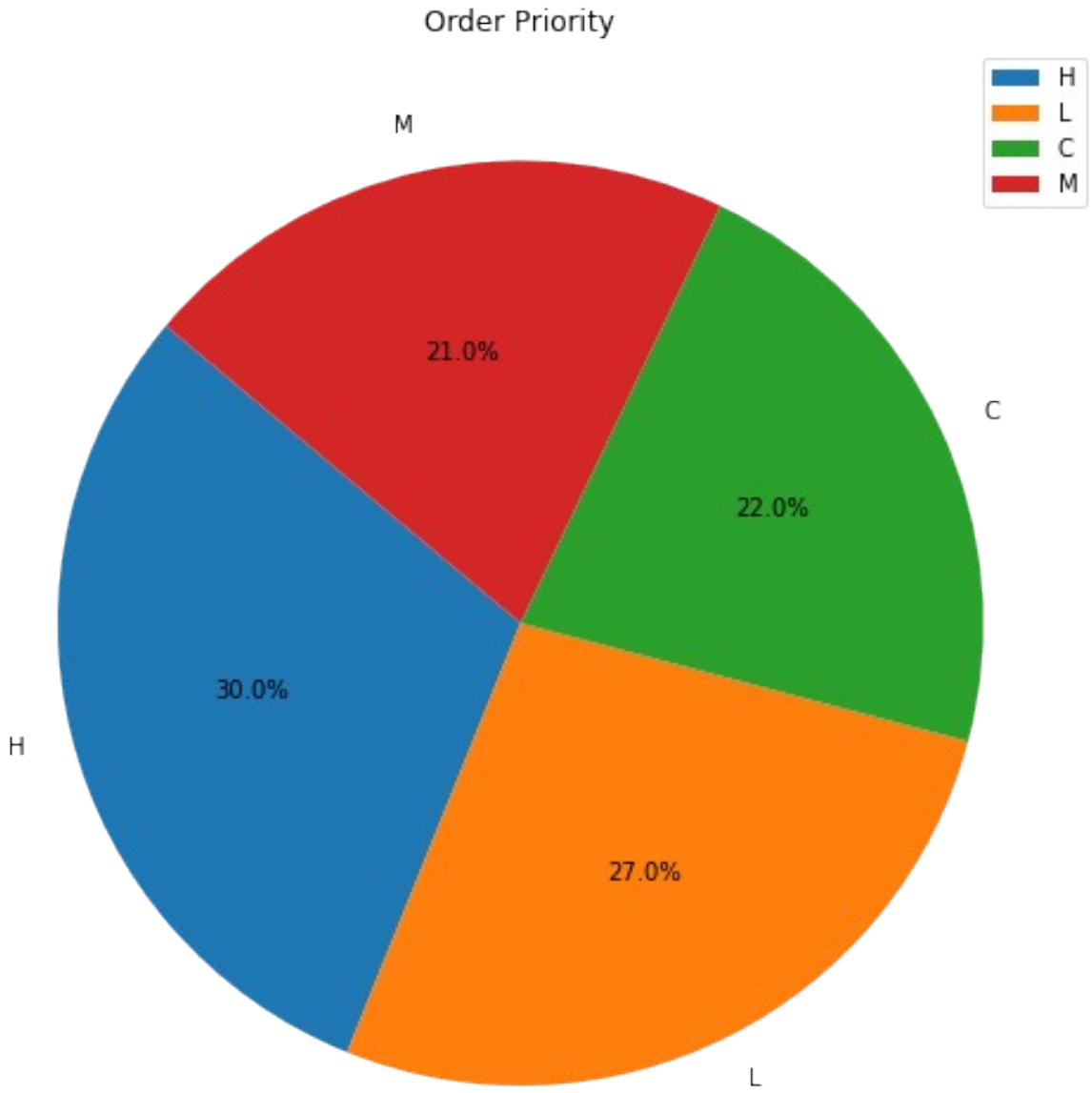



```
# Sales channel both online and offline were used equally(50%) to
order item type.

df = inp1['Order Priority'].value_counts(normalize=True)*100

print(df)
```

```
H    30.0
L    27.0
```

```
C    22.0
M    21.0
Name: Order Priority, dtype: float64
```

```
fig, ax = plt.subplots(figsize=(12, 9))
df.plot(kind='pie',ax=ax,autopct='%1.1f%%', startangle=140)
plt.title('Order Priority')
plt.ylabel('')
plt.legend(loc='upper right');
```



```
# Order priority H was the max with 30% followed by L which was 27%.M
was the least with 21%.

max_profit_row = inp1.sort_values(by='Total Profit',
ascending=False).iloc[0]

max_profit_country = max_profit_row['Country']

print(max_profit_country)
```

```
Pakistan
```

```
print(max_profit_row)
```

```
Region            Middle East and North Africa
Country                               Pakistan
Item Type                             Cosmetics
Sales Channel                           Offline
Order Priority                                L
Order Date                              7/5/2013
Order Year                                  2013
Order Quarter                                  3
Order Month                                    7
Order ID                               231145322
Ship Date                              8/16/2013
Units Sold                                  9892
Unit Price                                 437.2
Unit Cost                                 263.33
Total Revenue                            4324782.4
Total Cost                              2604860.36
Total Profit                            1719922.04
Name: 74, dtype: object
```

```
# Maximum profit for a individual item type was for cosmetics in
region  Middle East and North Africa
#and country Pakistan with a total profit of 1719922.04.

min_profit_row = inp1.sort_values(by='Total Profit',
ascending=True).iloc[0]

min_profit_country = min_profit_row['Country']

print(min_profit_country)
```

```
Kuwait
```

```
print(min_profit_row)
```

```
Region            Middle East and North Africa
Country                                 Kuwait
Item Type                               Fruits
Sales Channel                           Online
```

```
Order Priority                                M
Order Date                             4/30/2012
Order Year                                  2012
Order Quarter                                  2
Order Month                                    4
Order ID                               513417565
Ship Date                              5/18/2012
Units Sold                                   522
Unit Price                                  9.33
Unit Cost                                   6.92
Total Revenue                            4870.26
Total Cost                               3612.24
Total Profit                             1258.02
Name: 88, dtype: object
```

```
# Minimum profit for a individual item type was for 'Fruits' in region
'Middle East and North Africa',
#country  'Kuwait' with a total profit of '1258.02'.

max_UnitsSold_row =inp1.sort_values(by='Units Sold',
ascending=False).iloc[0]

print(max_UnitsSold_row)
```

```
Region             Australia and Oceania
Country                           Tuvalu
Item Type                      Baby Food
Sales Channel                    Offline
Order Priority                         H
Order Date                      5/28/2010
Order Year                           2010
Order Quarter                           2
Order Month                             5
Order ID                        669165933
Ship Date                       6/27/2010
Units Sold                           9925
Unit Price                         255.28
Unit Cost                          159.42
Total Revenue                   2533654.0
Total Cost                      1582243.5
Total Profit                     951410.5
Name: 0, dtype: object
```

```
# Maximum units sold for a individual item type was for "Baby food" in
region "Australia and Oceania",
#country 'Tuvalu' with total units sold '9925' .

min_UnitsSold_row =inp1.sort_values(by='Units Sold',
ascending=True).iloc[0]

min_UnitsSold_country = min_UnitsSold_row['Country']
```

```
print(min_UnitsSold_country)
```

```
Kyrgyzstan
```

```
print(min_UnitsSold_row)
```

```
Region                  Asia
Country            Kyrgyzstan
Item Type          Vegetables
Sales Channel          Online
Order Priority              H
Order Date          6/24/2011
Order Year               2011
Order Quarter               2
Order Month                 6
Order ID            814711606
Ship Date           7/12/2011
Units Sold                124
Unit Price             154.06
Unit Cost               90.93
Total Revenue        19103.44
Total Cost           11275.32
Total Profit          7828.12
Name: 10, dtype: object
```

```
# Minimum units sold for a individual item type was for 'vegetables'
in region 'Asia',
#country  'Kyrgyzstan' with total units sold '124' .
```

```
max_Revenue_row = inp1.sort_values(by='Total Revenue',
ascending=False).iloc[0]
```

```
max_Revenue_country = max_Revenue_row['Country']
```

```
print(max_Revenue_country)
```

```
Honduras
```

```
print(max_Revenue_row)
```

```
Region             Central America and the Caribbean
Country                                      Honduras
Item Type                                   Household
Sales Channel                                Offline
Order Priority                                     H
Order Date                                 2/8/2017
Order Year                                     2017
Order Quarter                                     1
Order Month                                       2
Order ID                                  522840487
Ship Date                                 2/13/2017
```

```
Units Sold                                     8974
Unit Price                                   668.27
Unit Cost                                    502.54
Total Revenue                              5997054.98
Total Cost                                 4509793.96
Total Profit                               1487261.02
Name: 13, dtype: object
```

```
# Maximum revenue for a individual item type was for 'Household' in
region 'Central America and the Caribbean',
#country 'Honduras' with total Revenue of '5997054.98' .

min_Revenue_row = inp1.sort_values(by='Total Revenue',
ascending=True).iloc[0]

min_Revenue_country = min_Revenue_row['Country']

print(min_Revenue_country)
```

```
Kuwait
```

```
print(min_Revenue_row)
```

```
Region             Middle East and North Africa
Country                                  Kuwait
Item Type                                Fruits
Sales Channel                            Online
Order Priority                                M
Order Date                             4/30/2012
Order Year                                  2012
Order Quarter                                  2
Order Month                                    4
Order ID                                513417565
Ship Date                               5/18/2012
Units Sold                                    522
Unit Price                                   9.33
Unit Cost                                    6.92
Total Revenue                             4870.26
Total Cost                                3612.24
Total Profit                              1258.02
Name: 88, dtype: object
```

```
# Minimum revenue for a individual item type was for ' Fruits' in
region ' Middle East and North Africa',
#country 'Kuwait' with total Revenue of '4870.26' .

max_Cost_row = inp1.sort_values(by='Unit Cost',
ascending=False).iloc[0]

max_Cost_country = max_Cost_row['Country']

print(max_Cost_country)
```

```
Brunei
```

```
print(max_Cost_row)
```

```
Region                          Asia
Country                       Brunei
Item Type           Office Supplies
Sales Channel                 Online
Order Priority                     L
Order Date                  4/1/2012
Order Year                      2012
Order Quarter                      2
Order Month                        4
Order ID                   320009267
Ship Date                   5/8/2012
Units Sold                      6708
Unit Price                    651.21
Unit Cost                     524.96
Total Revenue            4368316.68
Total Cost               3521431.68
Total Profit               846885.0
Name: 38, dtype: object
```

```
# Maximum Unit Cost for a individual item type was for 'Office
Supplies' in region 'Asia',
#country ' Brunei' with Unit Cost of '524.96' .

min_Cost_row = inp1.sort_values(by='Unit Cost',
ascending=True).iloc[0]

min_Cost_country = min_Cost_row['Country']

print(min_Cost_country)
```

```
Sao Tome and Principe
```

```
print(min_Cost_row)
```

```
Region                  Sub-Saharan Africa
Country            Sao Tome and Principe
Item Type                         Fruits
Sales Channel                    Offline
Order Priority                         H
Order Date                    9/17/2013
Order Year                         2013
Order Quarter                         3
Order Month                           9
Order ID                      508980977
Ship Date                    10/24/2013
Units Sold                         7637
Unit Price                         9.33
```

```
Unit Cost                          6.92
Total Revenue                  71253.21
Total Cost                     52848.04
Total Profit                   18405.17
Name: 54, dtype: object
```

```
# Minimum Unit Cost for a individual item type was for 'Fruits' in
region ' Sub-Saharan Africa',
#country ' Sao Tome and Principe' with Unit Cost of '6.92' .

max_Price_row = inp1.sort_values(by='Unit Price',
ascending=False).iloc[0]

max_Price_country = max_Price_row['Country']

print(max_Price_country)
```

```
Mozambique
```

```
print(max_Price_row)
```

```
Region             Sub-Saharan Africa
Country                    Mozambique
Item Type                   Household
Sales Channel                 Offline
Order Priority                      L
Order Date                  2/10/2012
Order Year                       2012
Order Quarter                       1
Order Month                         2
Order ID                    665095412
Ship Date                   2/15/2012
Units Sold                       5367
Unit Price                     668.27
Unit Cost                      502.54
Total Revenue                3586605.09
Total Cost                   2697132.18
Total Profit                  889472.91
Name: 99, dtype: object
```

```
# Maximum Unit Price for a individual item type was for 'Household' in
region 'Sub-Saharan Africa',
#country ' Mozambique' with Unit Price of ' 668.27' .

min_Price_row = inp1.sort_values(by='Unit Price',
ascending=True).iloc[0]

min_Price_country = min_Price_row['Country']

print(min_Price_country)
```

```
New Zealand
```

```
print(min_Price_row)
```

```
Region            Australia and Oceania
Country                     New Zealand
Item Type                        Fruits
Sales Channel                    Online
Order Priority                        H
Order Date                    9/8/2014
Order Year                        2014
Order Quarter                        3
Order Month                          9
Order ID                     142278373
Ship Date                    10/4/2014
Units Sold                        2187
Unit Price                        9.33
Unit Cost                         6.92
Total Revenue                 20404.71
Total Cost                    15134.04
Total Profit                   5270.67
Name: 23, dtype: object
```

```
# Minimum Unit Price for a individual item type was for 'Fruits' in
region '  Australia and Oceania',
#country 'New Zealand' with Unit Price of '9.33'.
```

```
inp1['Order ID'].value_counts().sum()
```

```
100
```

```
data = inp1.groupby(['Region'])[['Total Revenue']].sum()
data_sorted_desc = data.sort_values(by = 'Total Revenue',ascending =
False)
print(data_sorted_desc)
```

```
                                  Total Revenue
Region
Sub-Saharan Africa                  39672031.43
Europe                              33368932.11
Asia                                21347091.02
Australia and Oceania               14094265.13
Middle East and North Africa        14052706.58
Central America and the Caribbean    9170385.49
North America                        5643356.55
```

```
# Region 'Sub-Saharan Africa' has the most 'Total Revenue' of
'39672031.43' across all the years.
```

```
data.index
```

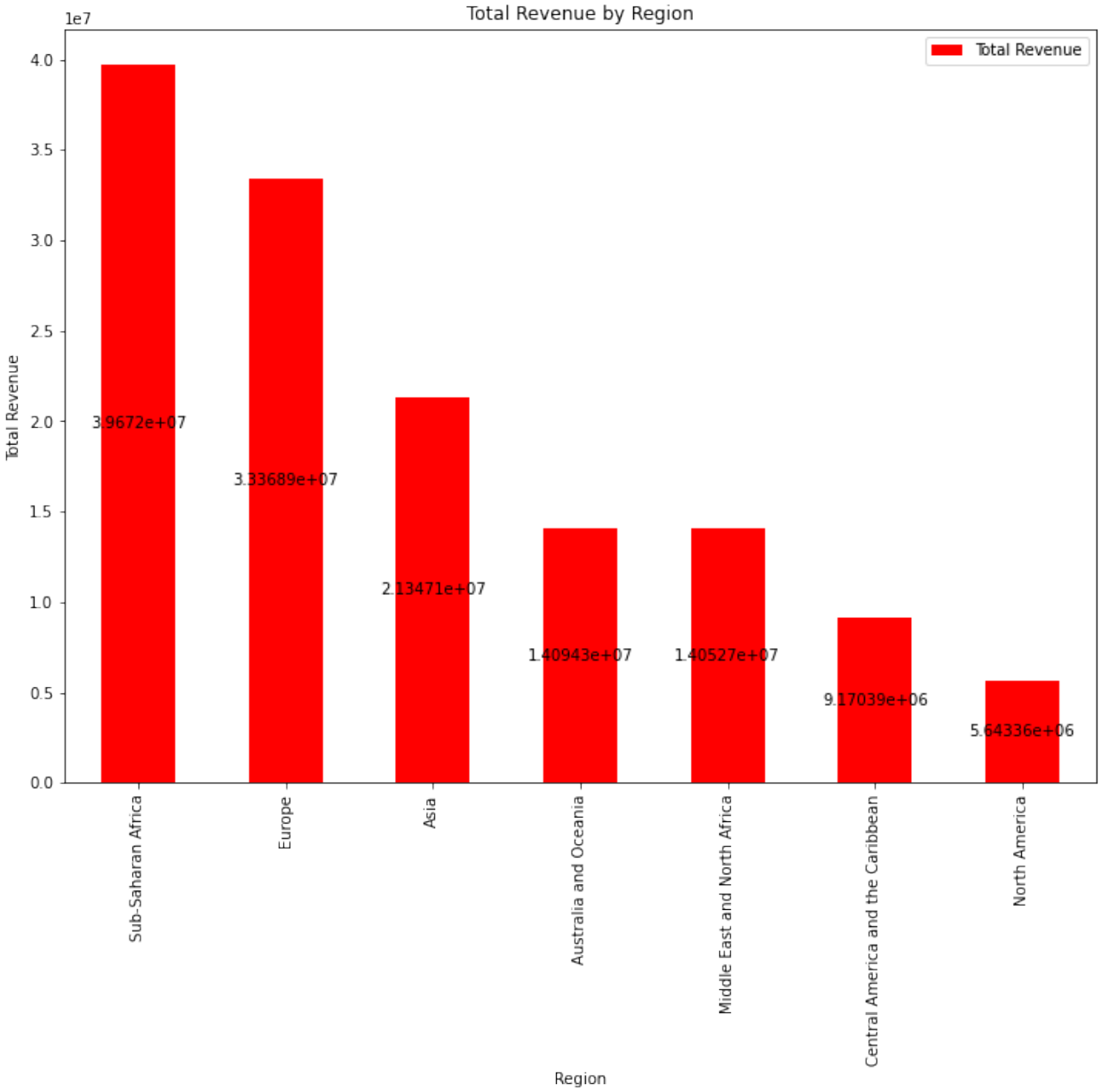
```
Index(['Asia', 'Australia and Oceania', 'Central America and the
Caribbean',
```

```
       'Europe', 'Middle East and North Africa', 'North America',
       'Sub-Saharan Africa'],
      dtype='object', name='Region')
```

```
data['Total Revenue']
```

```
Region
Asia                                    21347091.02
Australia and Oceania                   14094265.13
Central America and the Caribbean        9170385.49
Europe                                  33368932.11
Middle East and North Africa            14052706.58
North America                            5643356.55
Sub-Saharan Africa                      39672031.43
Name: Total Revenue, dtype: float64
```

```
fig, ax = plt.subplots(figsize=(12, 9))
data_sorted_desc.plot(kind='bar',color=['red'],ax=ax)
plt.title('Total Revenue by Region')
plt.xlabel('Region')
plt.ylabel('Total Revenue')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```

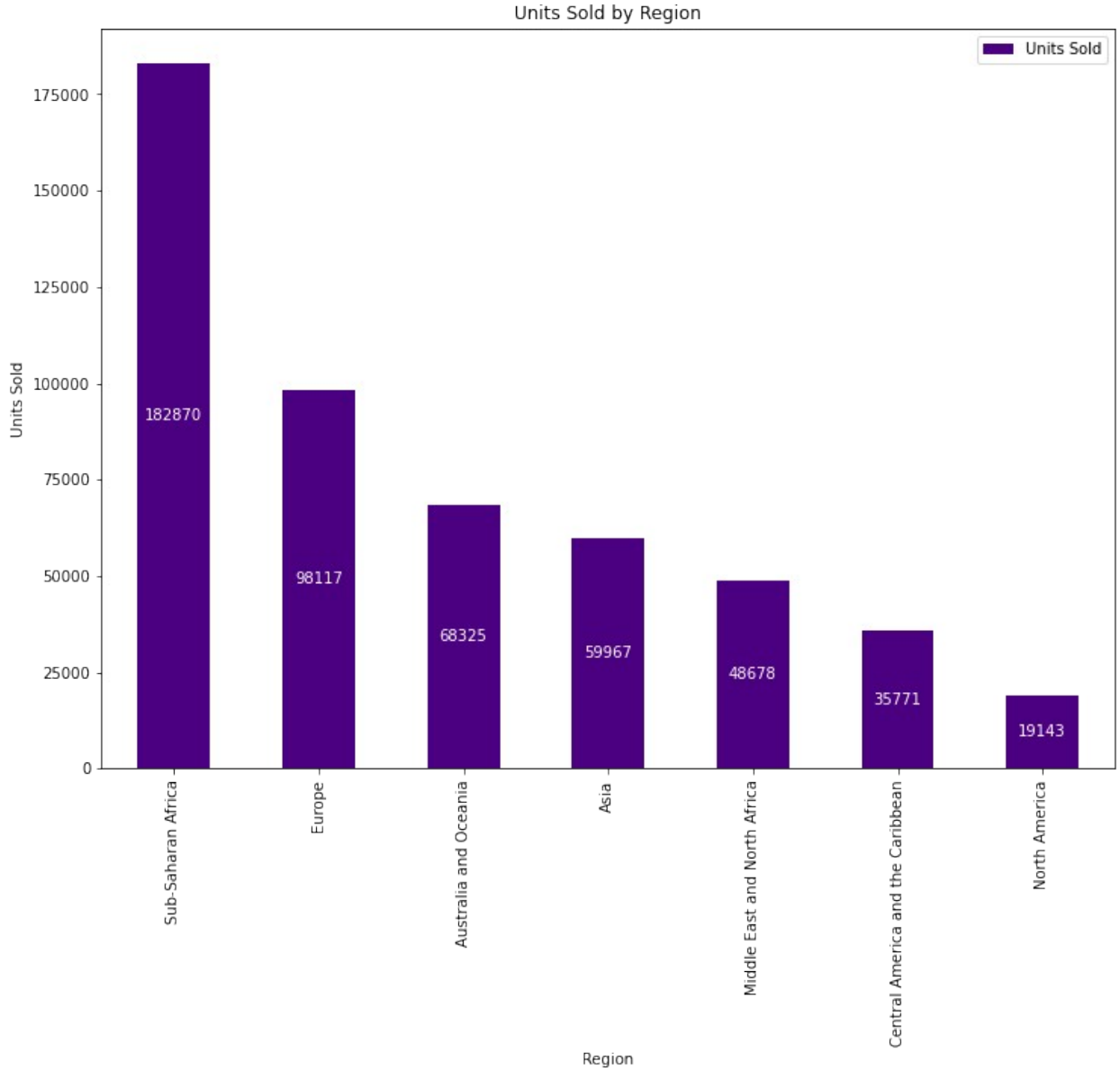



```
df_0 = inp1.groupby(['Region'])[['Units Sold']].sum()
df_0_sorted_desc = df_0.sort_values(by = 'Units Sold',ascending =
False)
print(df_0_sorted_desc)
```

Region	Units Sold
Sub-Saharan Africa	182870
Europe	98117
Australia and Oceania	68325
Asia	59967
Middle East and North Africa	48678

```
Central America and the Caribbean       35771
North America                           19143
```

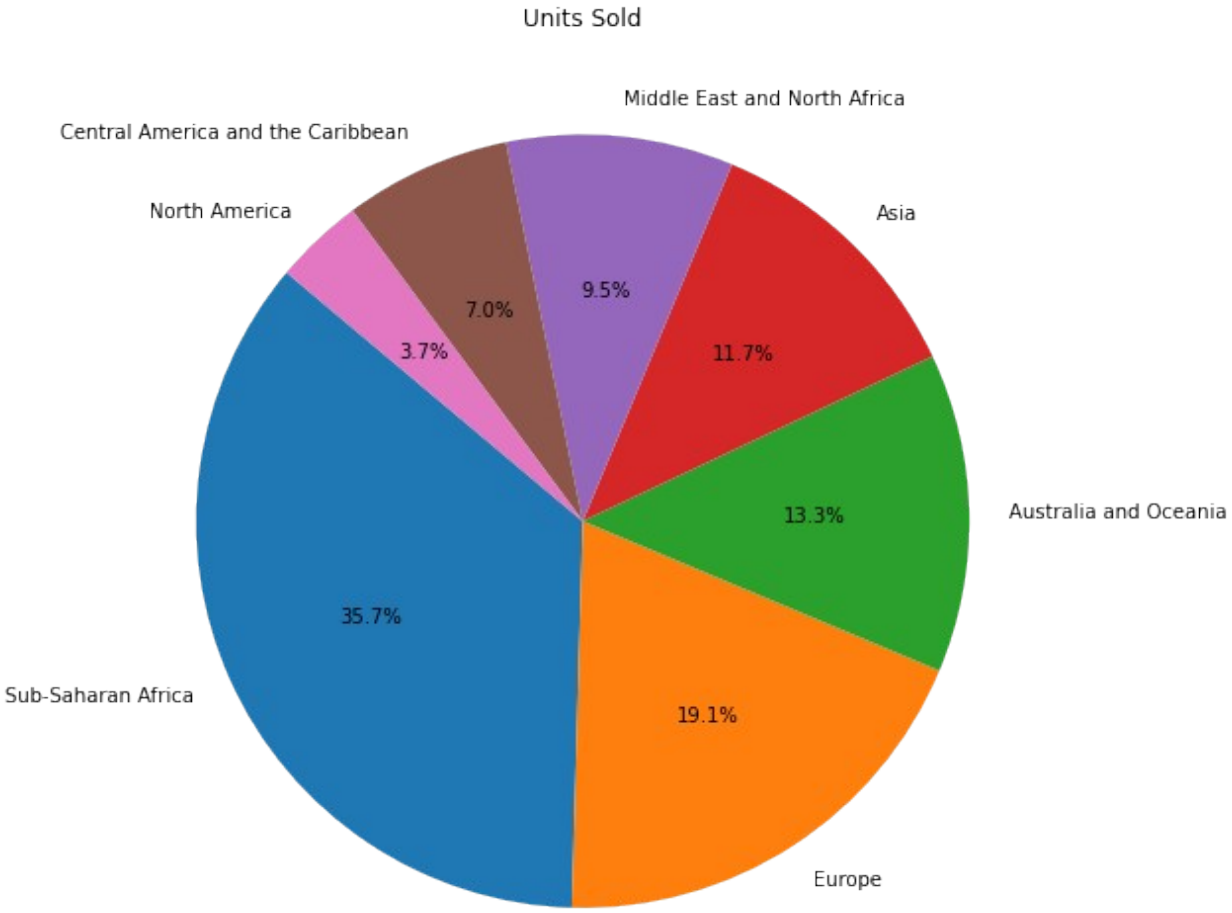
```
fig, ax = plt.subplots(figsize=(12, 9))
df_0_sorted_desc.plot(kind='bar',color=['indigo'],ax=ax)
plt.title('Units Sold by Region')
plt.xlabel('Region')
plt.ylabel('Units Sold')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center',color ='white')
```



```
# Region 'Sub-Saharan Africa' sold the most number of units '182870'
across all the years.

df_0 = inp1.groupby(['Region'])[['Units Sold']].sum()
df_0['Units Sold'] = (df_0['Units Sold'] / df_0['Units Sold'].sum()) *
100
df_0_sorted_desc = df_0.sort_values(by = 'Units Sold',ascending =
False)
df_0_sorted_desc = df_0_sorted_desc.round(2)
print(df_0_sorted_desc)
```

Region	Units Sold
Sub-Saharan Africa	35.66
Europe	19.13
Australia and Oceania	13.32
Asia	11.69
Middle East and North Africa	9.49
Central America and the Caribbean	6.97
North America	3.73

```
fig, ax = plt.subplots(figsize=(12, 9))
df_0_sorted_desc.plot(kind='pie', y='Units Sold', ax=ax,
autopct='%1.1f%%', startangle=140, legend=False)
plt.title('Units Sold')
plt.ylabel('')
plt.show()
```



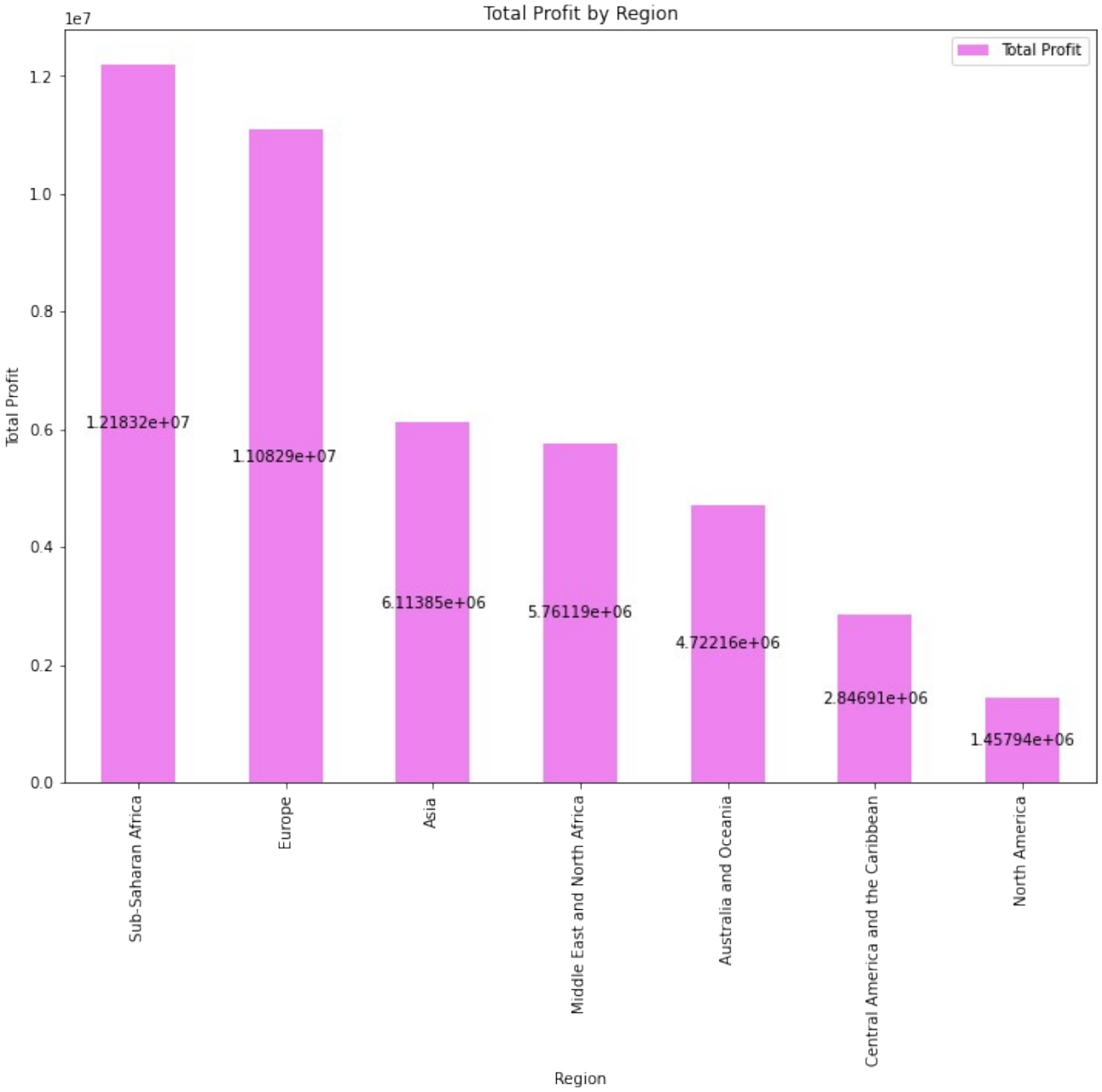

```
# Region 'Sub-Saharan Africa' sold the most number of units with a
share of  '35.7%' across all the years.

df_1 = inp1.groupby(['Region'])[['Total Profit']].sum()
df_1_sorted_desc = df_1.sort_values(by = 'Total Profit',ascending =
False)
print(df_1_sorted_desc)
```

```
                                  Total Profit
Region
Sub-Saharan Africa                12183211.40
Europe                            11082938.63
Asia                               6113845.87
Middle East and North Africa       5761191.86
Australia and Oceania              4722160.03
Central America and the Caribbean  2846907.85
North America                      1457942.76
```

```
df_1.index
```

```
Index(['Asia', 'Australia and Oceania', 'Central America and the
Caribbean',
       'Europe', 'Middle East and North Africa', 'North America',
       'Sub-Saharan Africa'],
      dtype='object', name='Region')
```

```
fig, ax = plt.subplots(figsize=(12, 9))
df_1_sorted_desc.plot(kind='bar',color=['violet'],ax=ax)
plt.title('Total Profit by Region')
plt.xlabel('Region')
plt.ylabel('Total Profit')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```

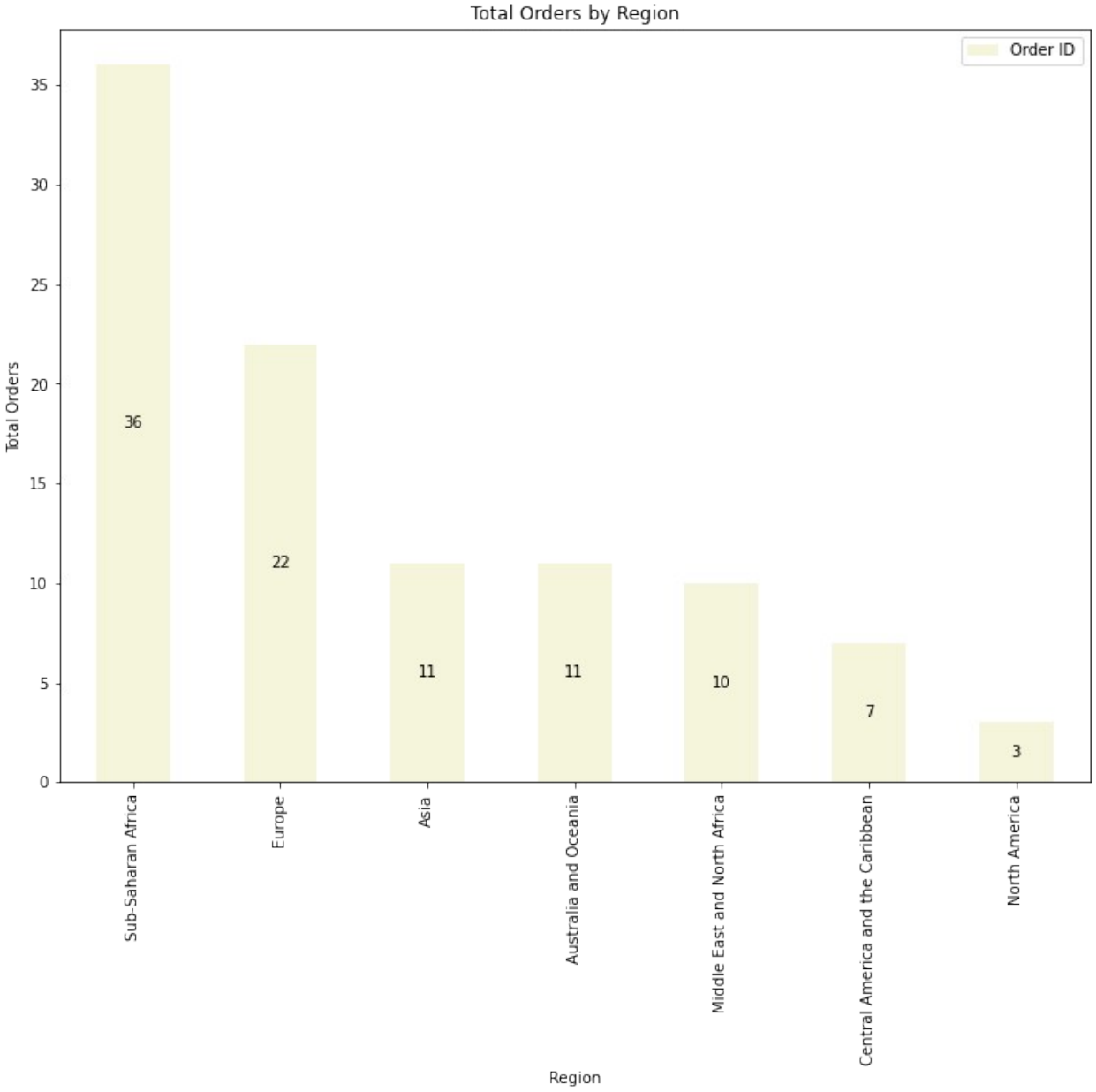



```
# Region 'Sub-Saharan Africa' made the highest profit of '12183211.40'
across all the years.

df_2 = inp1.groupby(['Region'])[['Order ID']].count()
df_2_sorted_desc = df_2.sort_values(by = 'Order ID',ascending = False)
print(df_2_sorted_desc)
```

Region	Order ID
Sub-Saharan Africa	36
Europe	22
Asia	11
Australia and Oceania	11

```
Middle East and North Africa              10
Central America and the Caribbean          7
North America                              3
```

```
fig, ax = plt.subplots(figsize=(12, 9))
df_2_sorted_desc.plot(kind='bar',color=['Beige'],ax=ax)
plt.title('Total Orders by Region')
plt.xlabel('Region')
plt.ylabel('Total Orders')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```

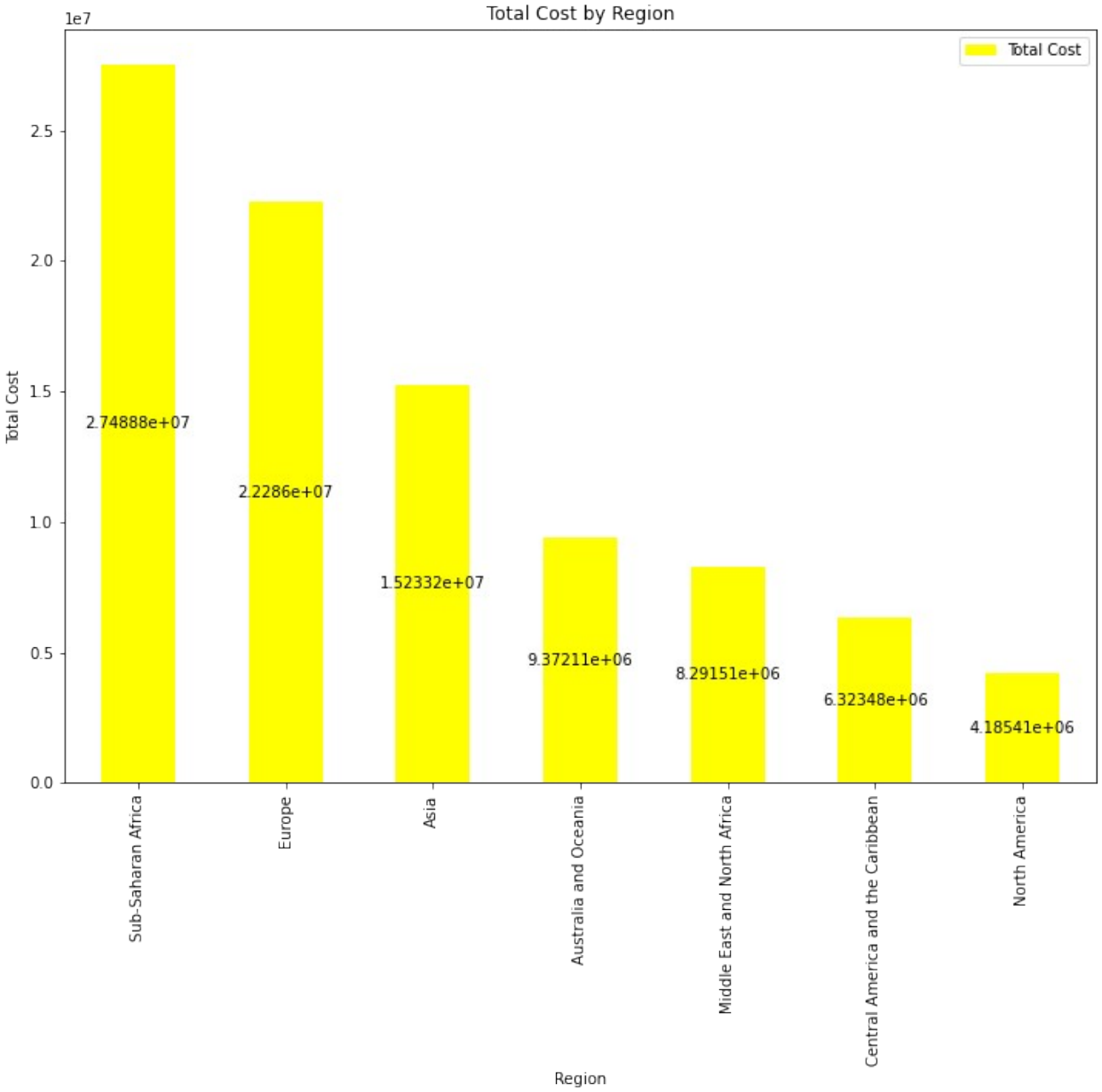



```
# Region 'Sub-Saharan Africa' had the highest number of orders of '36'
across all the years.

df_3 = inp1.groupby(['Region'])[['Total Cost']].sum()
df_3_sorted_desc = df_3.sort_values(by = 'Total Cost',ascending =
False)
print(df_3_sorted_desc)
```

```
                                Total Cost
Region
Sub-Saharan Africa              27488820.03
Europe                          22285993.48
```

```
Asia                                15233245.15
Australia and Oceania                9372105.10
Middle East and North Africa         8291514.72
Central America and the Caribbean    6323477.64
North America                        4185413.79
```

```
fig, ax = plt.subplots(figsize=(12, 9))
df_3_sorted_desc.plot(kind='bar',color=['yellow'],ax=ax)
plt.title('Total Cost by Region')
plt.xlabel('Region')
plt.ylabel('Total Cost')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```

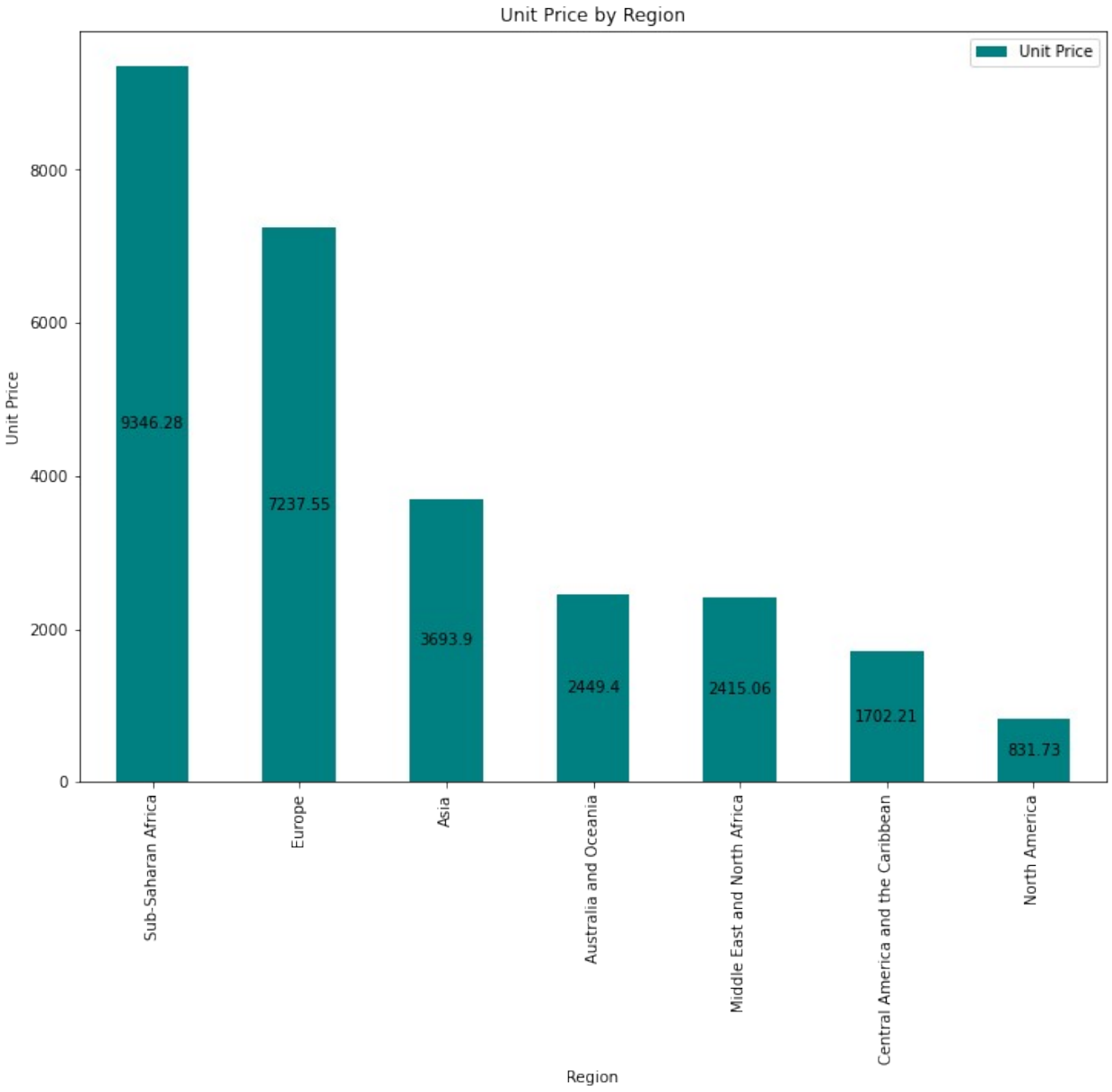



```
# Region 'Sub-Saharan Africa' had the highest 'Total Cost'of
'27488820.03' across all the years.

df_4 = inp1.groupby(['Region'])[['Unit Price']].sum()
df_4_sorted_desc = df_4.sort_values(by = 'Unit Price',ascending =
False)
print(df_4_sorted_desc)
```

```
                                Unit Price
Region
Sub-Saharan Africa                9346.28
Europe                            7237.55
Asia                              3693.90
```

```
Australia and Oceania                   2449.40
Middle East and North Africa            2415.06
Central America and the Caribbean       1702.21
North America                            831.73
```

```
fig, ax = plt.subplots(figsize=(12, 9))
df_4_sorted_desc.plot(kind='bar',color=['Teal'],ax=ax)
plt.title('Unit Price by Region')
plt.xlabel('Region')
plt.ylabel('Unit Price')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```

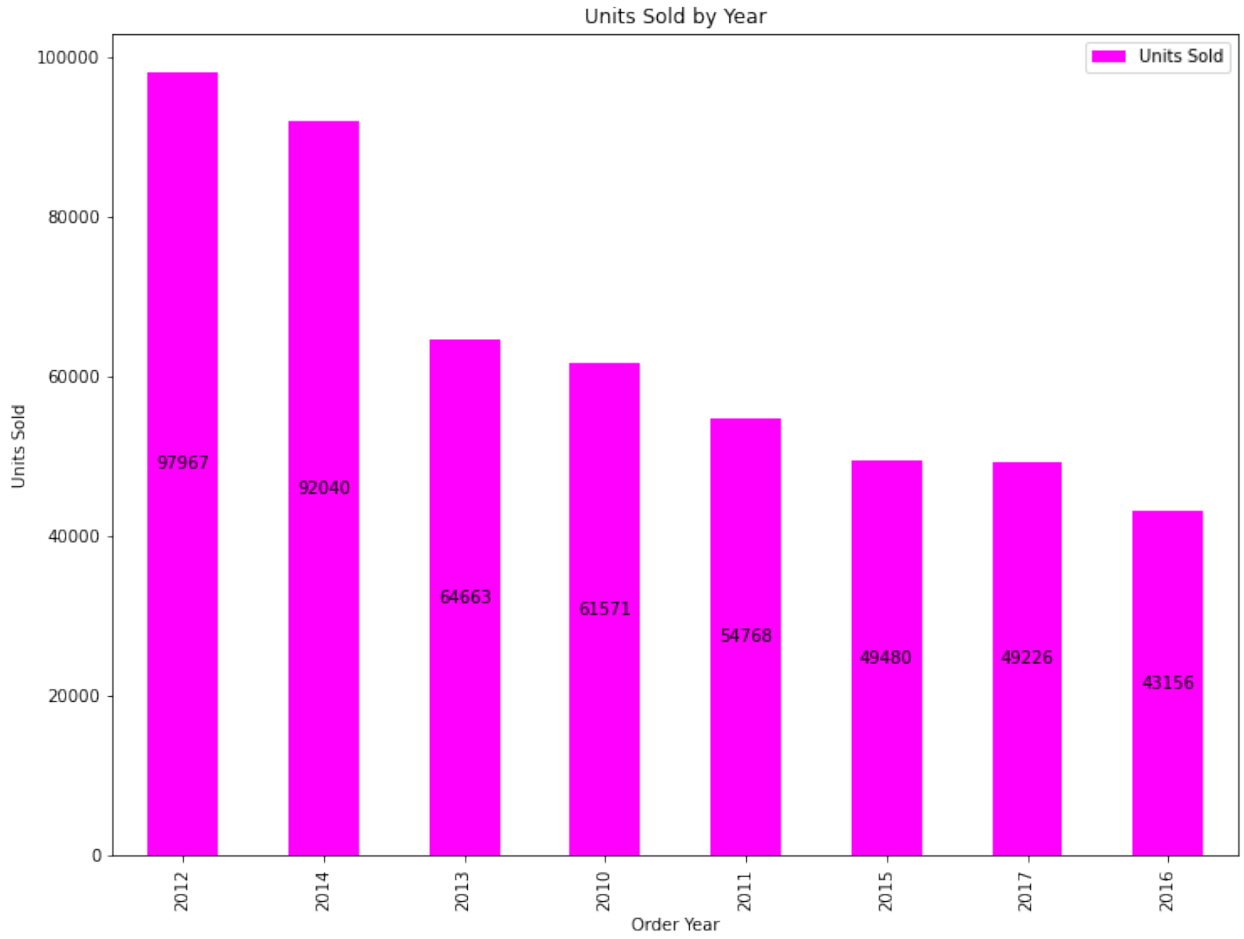



```
# Region 'Sub-Saharan Africa' had the highest 'Unit Price'of '9346.28'
across all the years.

df_5 = inp1.groupby(['Order Year'])[['Units Sold']].sum()
df_5_sorted_desc = df_5.sort_values(by = 'Units Sold',ascending =
False)
print(df_5_sorted_desc)
```

```
            Units Sold
Order Year
2012             97967
2014             92040
2013             64663
```

```
2010              61571
2011              54768
2015              49480
2017              49226
2016              43156
```

```
fig, ax = plt.subplots(figsize=(12, 9))
df_5_sorted_desc.plot(kind='bar',color=['Magenta'],ax=ax)
plt.title('Units Sold by Year')
plt.xlabel('Order Year')
plt.ylabel('Units Sold')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```

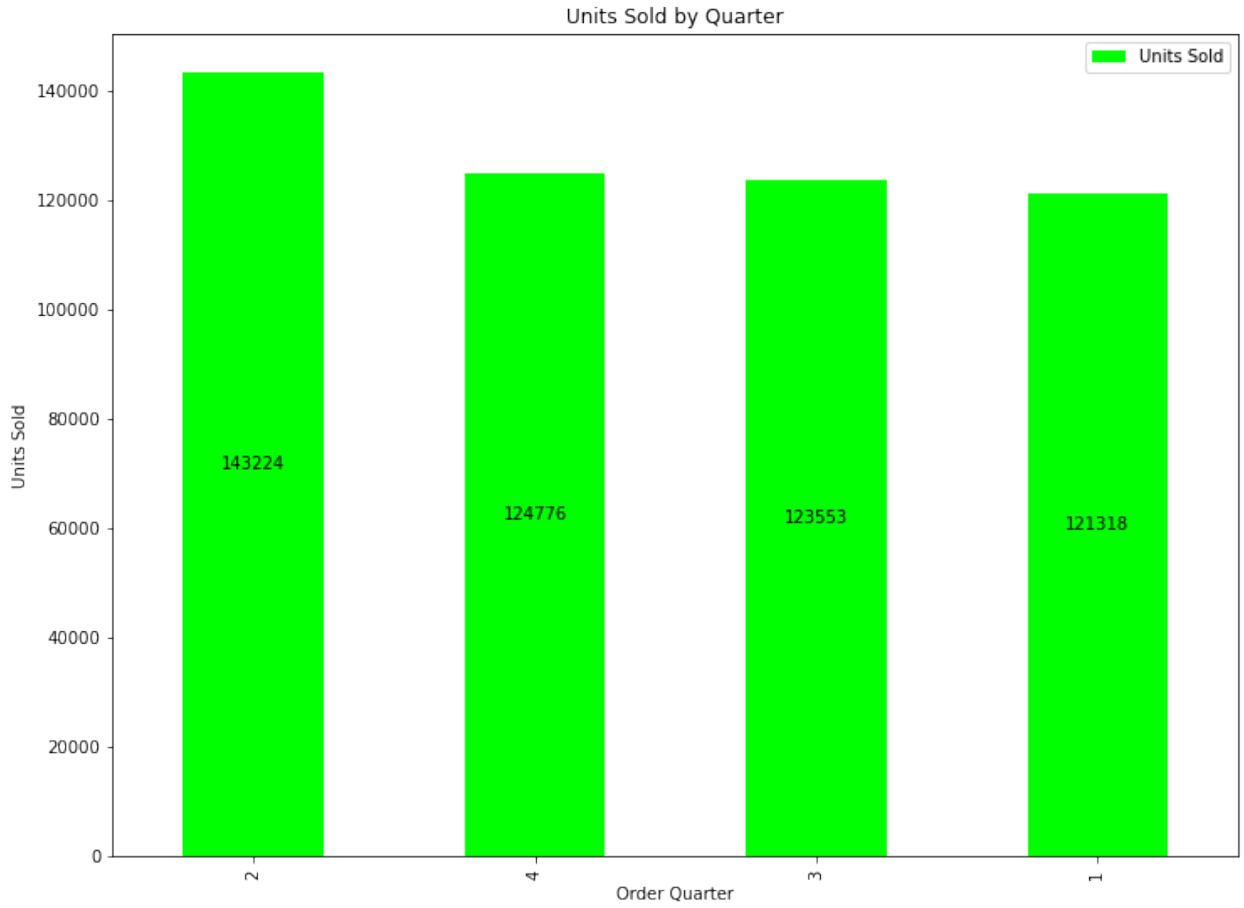



```
# In Year '2012' maximum number of units '97967' were sold across all Regions.
```

```
df_6 = inp1.groupby(['Order Quarter'])[['Units Sold']].sum()
df_6_sorted_desc = df_6.sort_values(by = 'Units Sold',ascending =
False)
print(df_6_sorted_desc)
```

```
               Units Sold
Order Quarter
2                  143224
4                  124776
3                  123553
1                  121318
```

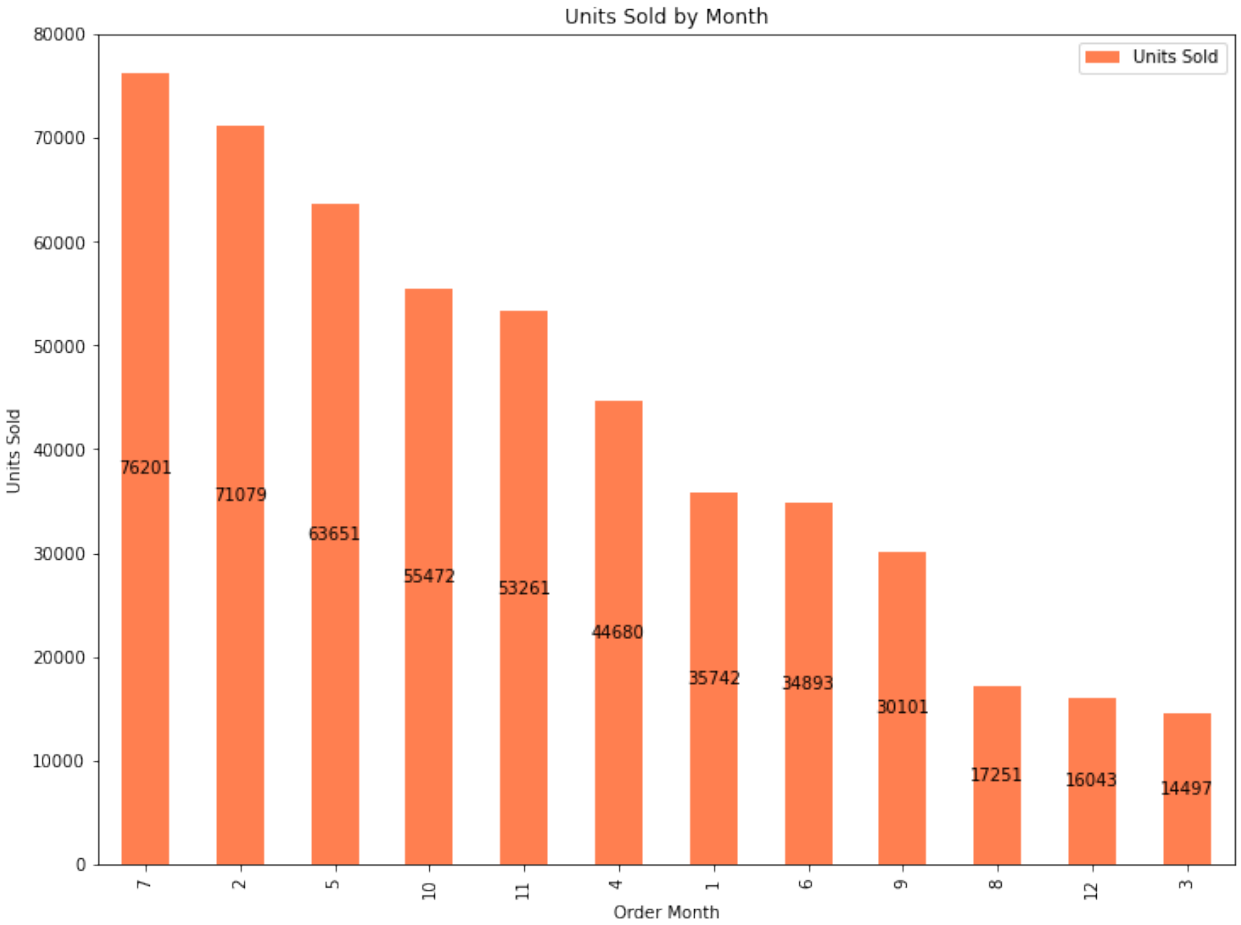
```
fig, ax = plt.subplots(figsize=(12, 9))
df_6_sorted_desc.plot(kind='bar',color=['Lime'],ax=ax)
plt.title('Units Sold by Quarter')
plt.xlabel('Order Quarter')
plt.ylabel('Units Sold')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```



```
# In Quarter '2' - months of 'May','June','July','August' where
maximum number of units '143224' were sold
#across all the 'Years' & 'Regions'.

df_7 = inp1.groupby(['Order Month'])[['Units Sold']].sum()
df_7_sorted_desc = df_7.sort_values(by='Units Sold', ascending=False)
print(df_7_sorted_desc)
```

```
              Units Sold
Order Month
7                  76201
2                  71079
5                  63651
10                 55472
11                 53261
4                  44680
1                  35742
6                  34893
9                  30101
8                  17251
12                 16043
3                  14497
```

```
fig, ax = plt.subplots(figsize=(12, 9))
df_7_sorted_desc.plot(kind='bar',color=['Coral'],ax=ax)
plt.title('Units Sold by Month')
plt.xlabel('Order Month')
plt.ylabel('Units Sold')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```

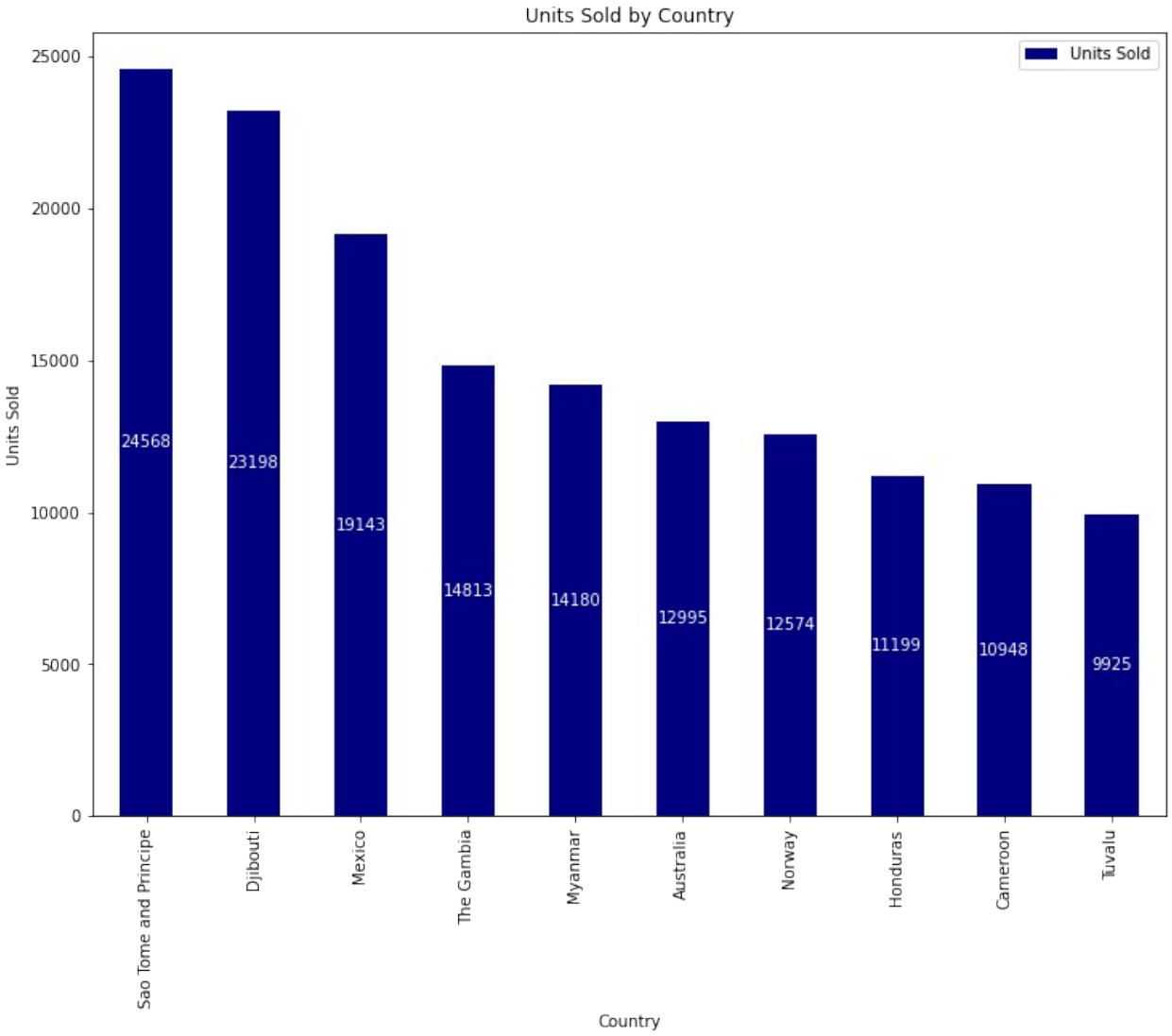



```
# In the month '7'-'July' where maximum number of units '76201' were
sold across all the 'Years' & 'Regions'.

df_8 = inp1.groupby(['Country'])[['Units Sold']].sum()
df_8_sorted_desc = df_8.sort_values(by='Units Sold', ascending=False)
print(df_8_sorted_desc.head(10))
```

```
                       Units Sold
Country
Sao Tome and Principe       24568
Djibouti                    23198
Mexico                      19143
The Gambia                  14813
Myanmar                     14180
Australia                   12995
Norway                      12574
Honduras                    11199
Cameroon                    10948
Tuvalu                       9925
```

```
fig, ax = plt.subplots(figsize=(12,9))
df_8_sorted_desc.head(10).plot(kind='bar',color=['Navy'],ax=ax)
```

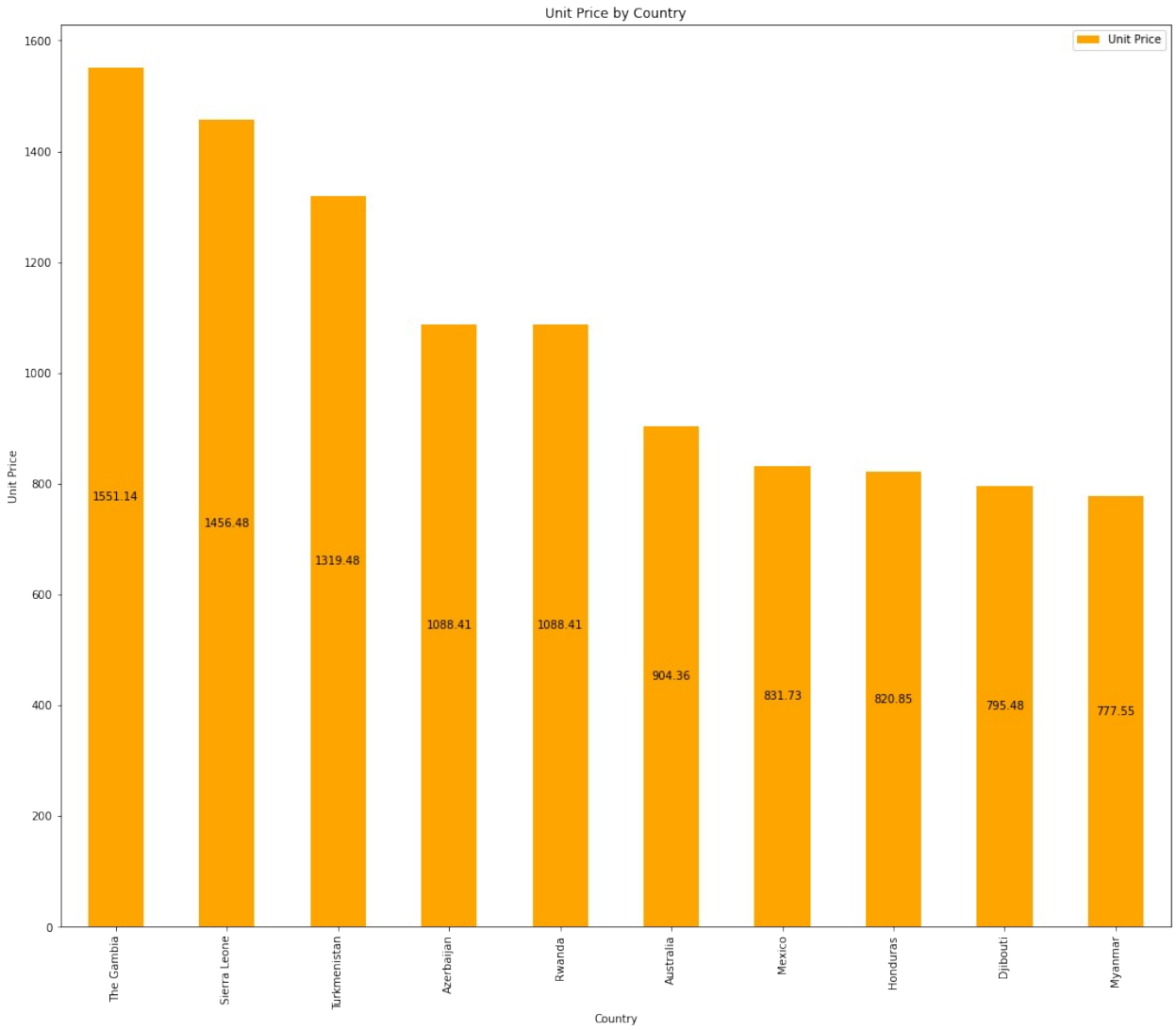
```
plt.title('Units Sold by Country')
plt.xlabel('Country')
plt.ylabel('Units Sold')
plt.legend(loc='upper right');

for container in ax.containers:
    ax.bar_label(container, label_type='center',color ='white')
```




```
# Country 'Sao Tome and Principe' maximum number of units '24568' were
sold across all the 'Years'.

df_19 = inp1.groupby(['Country'])[['Unit Price']].sum()
df_19_sorted_desc = df_19.sort_values(by='Unit Price',
ascending=False)
print(df_19_sorted_desc.head(10))
```

```
              Unit Price
Country
The Gambia       1551.14
Sierra Leone     1456.48
Turkmenistan     1319.48
Azerbaijan       1088.41
Rwanda           1088.41
Australia         904.36
Mexico            831.73
Honduras          820.85
Djibouti          795.48
Myanmar           777.55
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_19_sorted_desc.head(10).plot(kind='bar',color=['orange'],ax=ax)
plt.title('Unit Price by Country')
plt.xlabel('Country')
plt.ylabel('Unit Price')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```

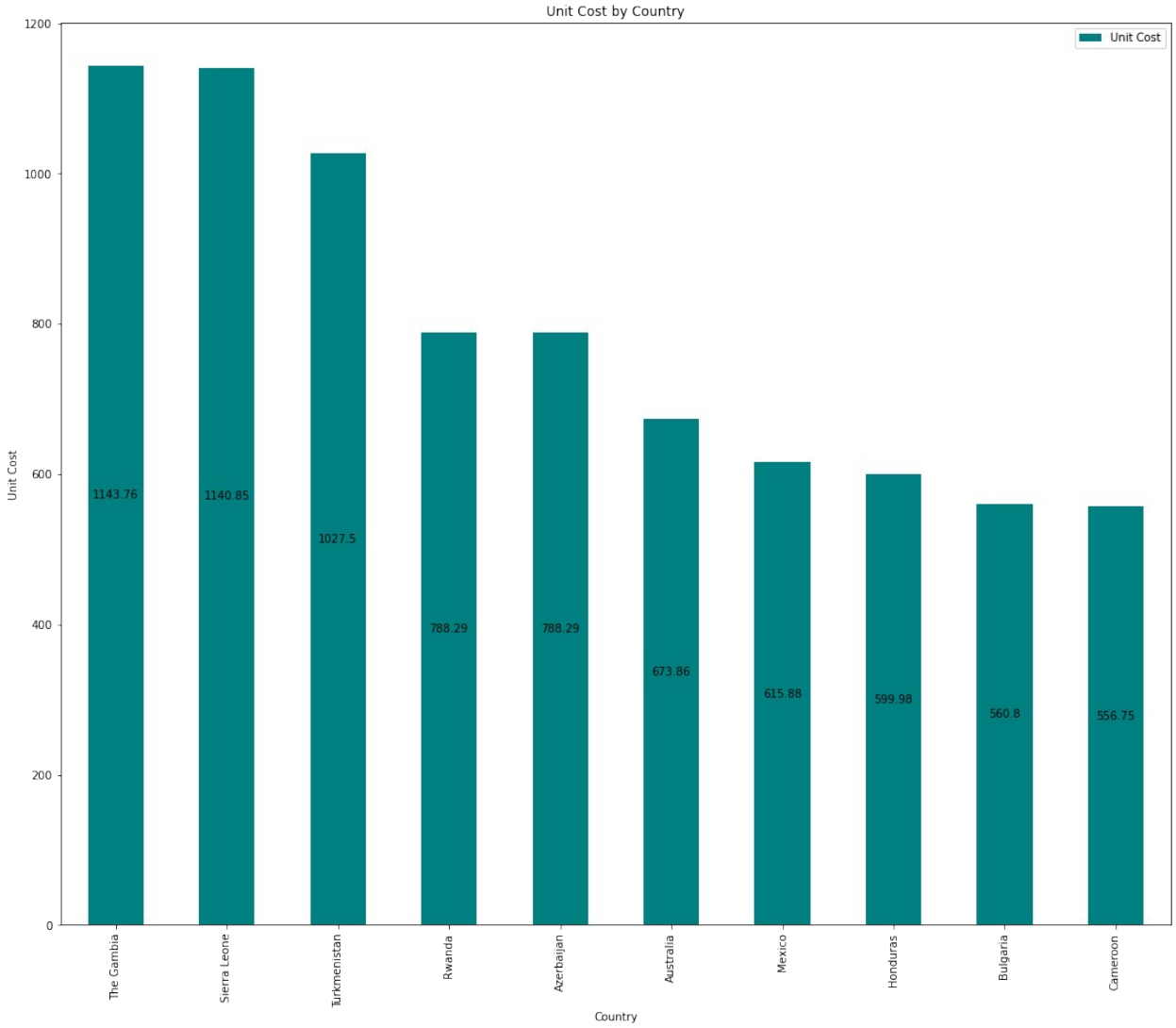



```
# Country 'The Gamibia' had the maximum consolidated 'Unit Price' of '
1551.14' across all the 'Years'.

df_20 = inp1.groupby(['Country'])[['Unit Cost']].sum()
df_20_sorted_desc = df_20.sort_values(by='Unit Cost', ascending=False)
print(df_20_sorted_desc.head(10))
```

Country	Unit Cost
The Gambia	1143.76
Sierra Leone	1140.85
Turkmenistan	1027.50
Rwanda	788.29
Azerbaijan	788.29
Australia	673.86
Mexico	615.88
Honduras	599.98

```
Bulgaria          560.80
Cameroon          556.75
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_20_sorted_desc.head(10).plot(kind='bar',color=['teal'],ax=ax)
plt.title('Unit Cost by Country')
plt.xlabel('Country')
plt.ylabel('Unit Cost')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```

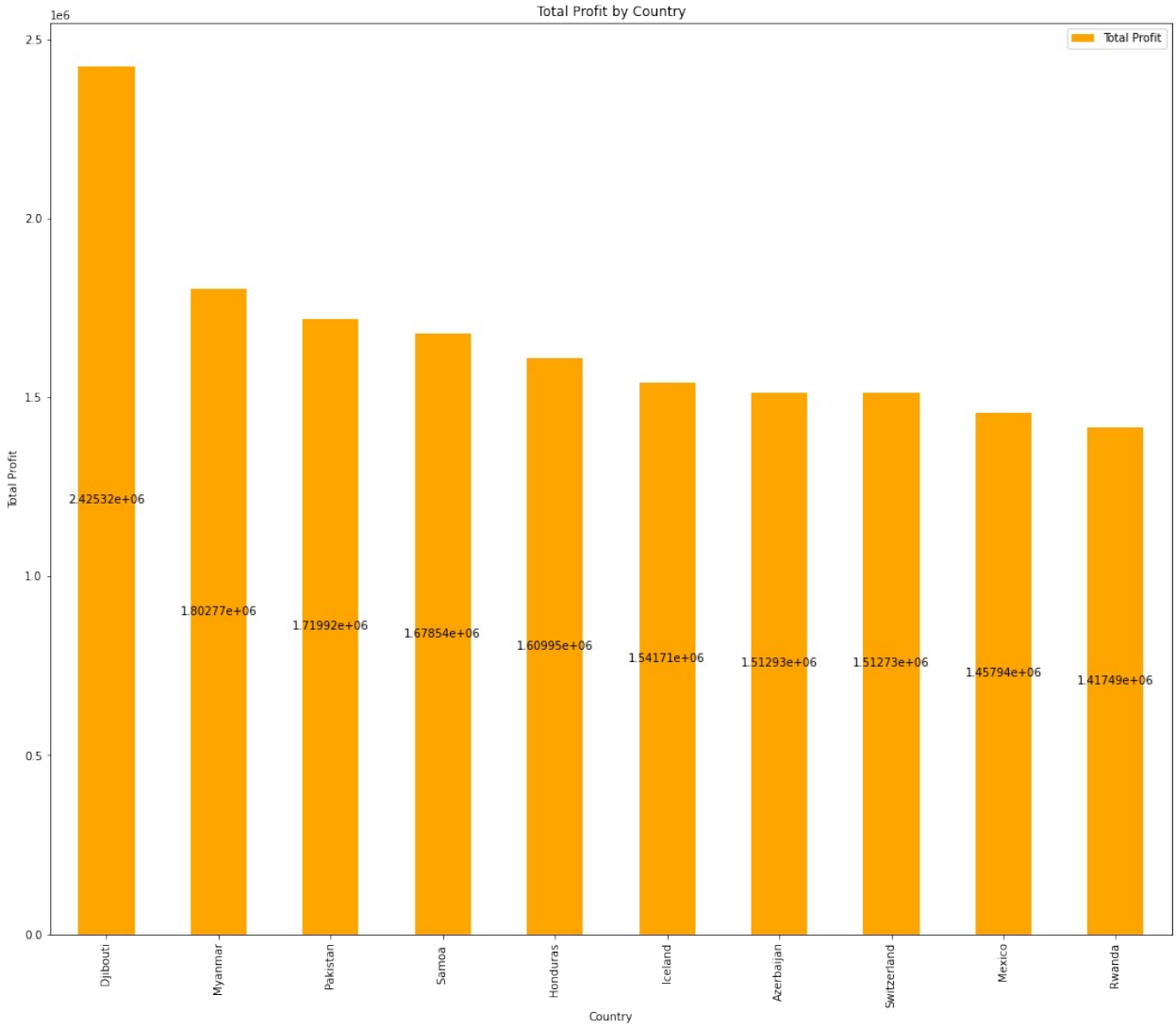



```
# Country 'The Gamibia' had the maximum consolidated 'Unit Cost' of
'1143.76' across all the 'Years'.
```

```
df_9 = inp1.groupby(['Country'])[['Total Profit']].sum()
df_9_sorted_desc = df_9.sort_values(by='Total Profit',
ascending=False)
print(df_9_sorted_desc.head(10))
```

```
             Total Profit
Country
Djibouti       2425317.87
Myanmar        1802771.70
Pakistan       1719922.04
Samoa          1678540.98
Honduras       1609947.52
Iceland        1541705.29
Azerbaijan     1512926.83
Switzerland    1512729.45
Mexico         1457942.76
Rwanda         1417493.49
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_9_sorted_desc.head(10).plot(kind='bar',color=['orange'],ax=ax)
plt.title('Total Profit by Country')
plt.xlabel('Country')
plt.ylabel('Total Profit')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```

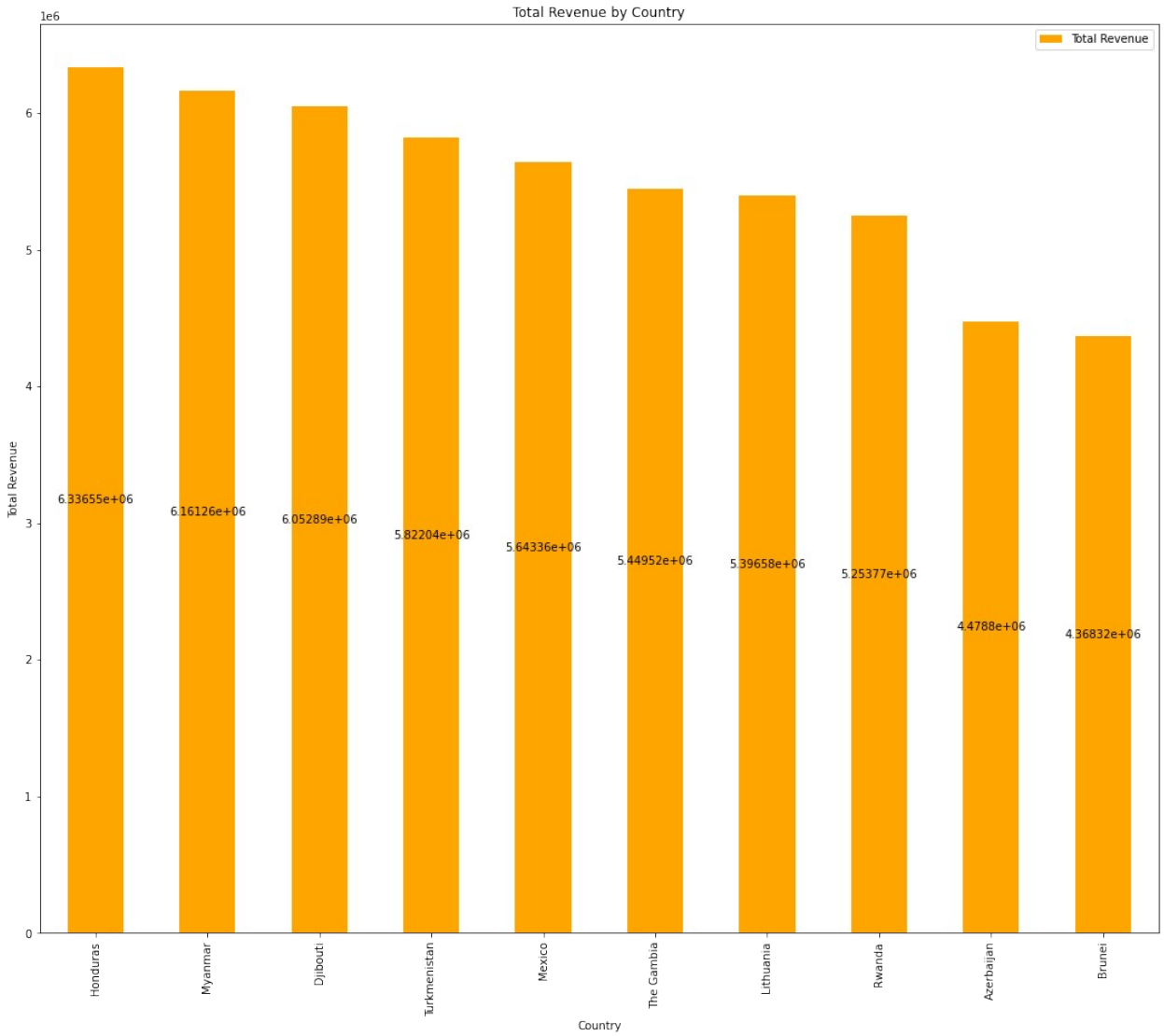



```
# Country 'Dijibouti' had the maximum consolidated 'Total Profit' of '
2425317.87' across all the 'Years'.

df_9 = inp1.groupby(['Country'])[['Total Revenue']].sum()
df_9_sorted_desc = df_9.sort_values(by='Total Revenue',
ascending=False)
print(df_9_sorted_desc.head(10))
```

```
              Total Revenue
Country
Honduras         6336545.48
Myanmar          6161257.90
Djibouti         6052890.86
Turkmenistan     5822036.20
Mexico           5643356.55
The Gambia       5449517.95
Lithuania        5396577.27
```

```
Rwanda              5253769.42
Azerbaijan          4478800.21
Brunei              4368316.68
```

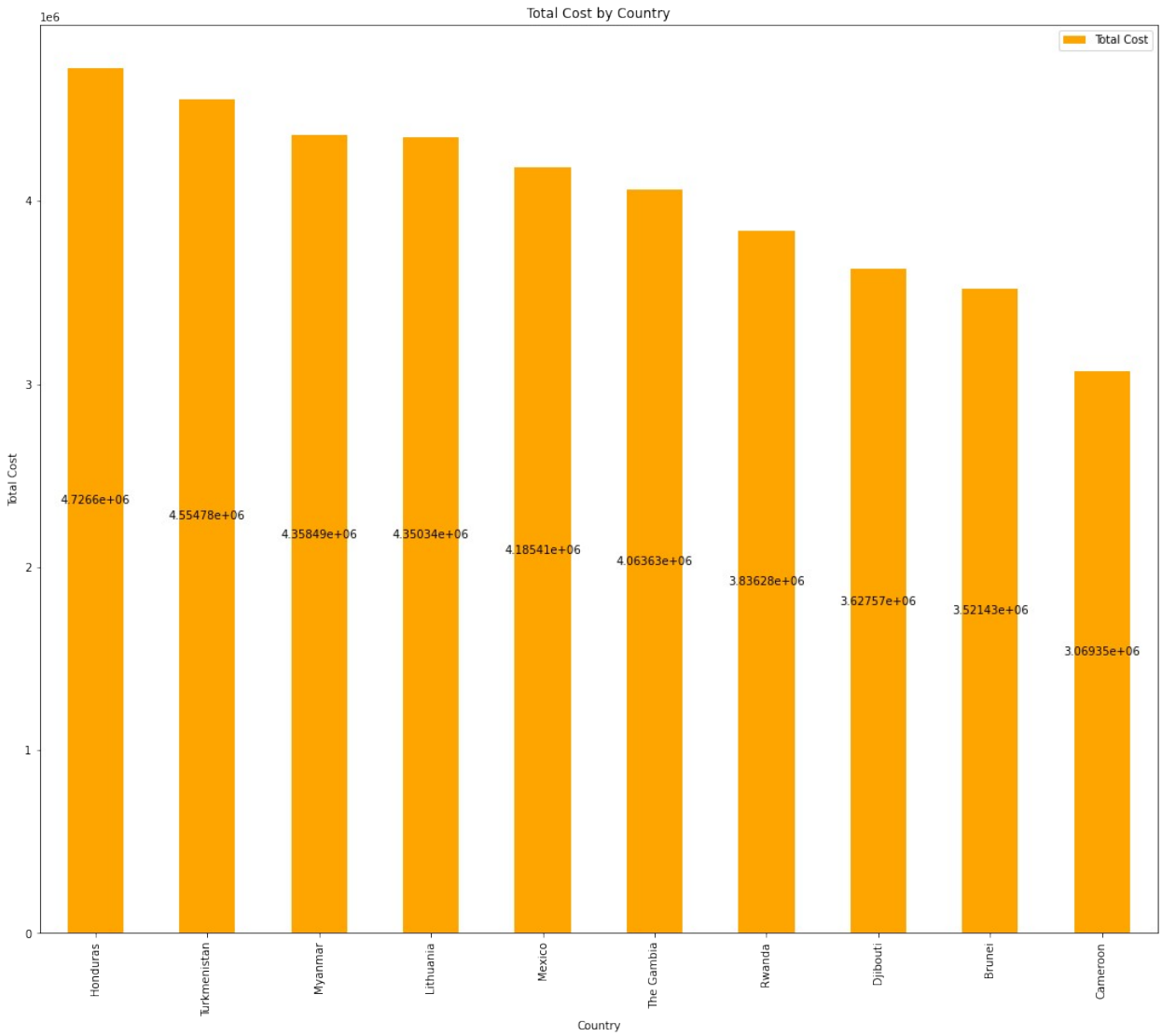
```
fig, ax = plt.subplots(figsize=(18, 15))
df_9_sorted_desc.head(10).plot(kind='bar',color=['orange'],ax=ax)
plt.title('Total Revenue by Country')
plt.xlabel('Country')
plt.ylabel('Total Revenue')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```



```
# Country 'Honduras' had the maximum consolidated 'Total Revenue' of
'6336545.48' across all the 'Years'.

df_9 = inp1.groupby(['Country'])[['Total Cost']].sum()
df_9_sorted_desc = df_9.sort_values(by='Total Cost', ascending=False)
print(df_9_sorted_desc.head(10))
```

```
               Total Cost
Country
Honduras      4726597.96
Turkmenistan  4554777.80
Myanmar       4358486.20
Lithuania     4350343.52
Mexico        4185413.79
The Gambia    4063634.68
Rwanda        3836275.93
Djibouti      3627572.99
Brunei        3521431.68
Cameroon      3069348.98
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_9_sorted_desc.head(10).plot(kind='bar',color=['orange'],ax=ax)
plt.title('Total Cost by Country')
plt.xlabel('Country')
plt.ylabel('Total Cost')
plt.legend(loc='upper right');

# Data labels
for container in ax.containers:
    ax.bar_label(container, label_type='center')
```




```
# Country 'Honduras' had the maximum consolidated'Total cost' of
'4726597.96' across all the 'Years'.

inp1['Order Date'] = pd.to_datetime(inp1['Order Date'])
inp1['Ship Date'] = pd.to_datetime(inp1['Ship Date'])

# Calculate the difference in days
inp1['Days Difference'] = (inp1['Ship Date'] - inp1['Order
Date']).dt.days

print(inp1)
```

```
                                Region
Country  \
0                Australia and Oceania
Tuvalu
1   Central America and the Caribbean
```

```
Grenada
2                               Europe
Russia
3                  Sub-Saharan Africa             Sao Tome and
Principe
4                  Sub-Saharan Africa
Rwanda
5                Australia and Oceania                   Solomon
Islands
6                  Sub-Saharan Africa
Angola
7                  Sub-Saharan Africa                       Burkina
Faso
8                  Sub-Saharan Africa             Republic of the
Congo
9                  Sub-Saharan Africa
Senegal
10                               Asia
Kyrgyzstan
11                 Sub-Saharan Africa                         Cape
Verde
12                               Asia
Bangladesh
13  Central America and the Caribbean
Honduras
14                               Asia
Mongolia
15                              Europe
Bulgaria
16                               Asia                          Sri
Lanka
17                 Sub-Saharan Africa
Cameroon
18                               Asia
Turkmenistan
19               Australia and Oceania                       East
Timor
20                              Europe
Norway
21                              Europe
Portugal
22  Central America and the Caribbean
Honduras
23               Australia and Oceania                        New
Zealand
24                              Europe                          Moldova

25                              Europe
France
```

```
26               Australia and Oceania                                 
Kiribati
27                  Sub-Saharan Africa                                 
Mali
28                               Europe                                
Norway
29                  Sub-Saharan Africa                                  The
Gambia
30                               Europe                                
Switzerland
31                  Sub-Saharan Africa                                 South
Sudan
32               Australia and Oceania                                 
Australia
33                                 Asia                                
Myanmar
34                  Sub-Saharan Africa                                 
Djibouti
35  Central America and the Caribbean                                   Costa
Rica
36       Middle East and North Africa                                  
Syria
37                  Sub-Saharan Africa                                  The
Gambia
38                                 Asia                                
Brunei
39                               Europe                                
Bulgaria
40                  Sub-Saharan Africa                                 
Niger
41       Middle East and North Africa                                  
Azerbaijan
42                  Sub-Saharan Africa                                  The
Gambia
43                               Europe                                
Slovakia
44                                 Asia                                
Myanmar
45                  Sub-Saharan Africa                                 
Comoros
46                               Europe                                
Iceland
47                               Europe                                
Switzerland
48                               Europe                                
Macedonia
49                  Sub-Saharan Africa                                 
Mauritania
50                               Europe
```

```
Albania
51                  Sub-Saharan Africa
Lesotho
52       Middle East and North Africa                        Saudi
Arabia
53                  Sub-Saharan Africa                        Sierra
Leone
54                  Sub-Saharan Africa              Sao Tome and
Principe
55                  Sub-Saharan Africa                       Cote
d'Ivoire
56               Australia and Oceania
Fiji
57                               Europe
Austria
58                               Europe                     United
Kingdom
59                  Sub-Saharan Africa
Djibouti
60               Australia and Oceania
Australia
61                               Europe                           San
Marino
62                  Sub-Saharan Africa
Cameroon
63       Middle East and North Africa
Libya
64  Central America and the Caribbean
Haiti
65                  Sub-Saharan Africa
Rwanda
66                  Sub-Saharan Africa
Gabon
67  Central America and the Caribbean
Belize
68                               Europe
Lithuania
69                  Sub-Saharan Africa
Madagascar
70                                 Asia
Turkmenistan
71       Middle East and North Africa
Libya
72                  Sub-Saharan Africa  Democratic Republic of the
Congo
73                  Sub-Saharan Africa
Djibouti
74       Middle East and North Africa
Pakistan
```

```
75                        North America                                    
Mexico
76               Australia and Oceania    Federated States of             
Micronesia
77                                 Asia                                    
Laos
78                               Europe                                    
Monaco
79               Australia and Oceania                               Samoa

80                               Europe                                    
Spain
81       Middle East and North Africa                                      
Lebanon
82       Middle East and North Africa                                      
Iran
83                  Sub-Saharan Africa                                     
Zambia
84                  Sub-Saharan Africa                                     
Kenya
85                        North America                                    
Mexico
86                  Sub-Saharan Africa              Sao Tome and           
Principe
87                  Sub-Saharan Africa                          The        
Gambia
88       Middle East and North Africa                                      
Kuwait
89                               Europe                                    
Slovenia
90                  Sub-Saharan Africa                         Sierra      
Leone
91               Australia and Oceania                                     
Australia
92       Middle East and North Africa                                      
Azerbaijan
93                               Europe                                    
Romania
94  Central America and the Caribbean                                      
Nicaragua
95                  Sub-Saharan Africa                                     
Mali
96                                 Asia                                    
Malaysia
97                  Sub-Saharan Africa                         Sierra      
Leone
98                        North America                                    
Mexico
99                  Sub-Saharan Africa
```

```
Mozambique

          Item Type Sales Channel Order Priority Order Date  Order
Year  \
0         Baby Food       Offline              H 2010-05-28
2010
1            Cereal        Online              C 2012-08-22
2012
2   Office Supplies       Offline              L 2014-05-02
2014
3            Fruits        Online              C 2014-06-20
2014
4   Office Supplies       Offline              L 2013-02-01
2013
5         Baby Food        Online              C 2015-02-04
2015
6         Household       Offline              M 2011-04-23
2011
7        Vegetables        Online              H 2012-07-17
2012
8     Personal Care       Offline              M 2015-07-14
2015
9            Cereal        Online              H 2014-04-18
2014
10       Vegetables        Online              H 2011-06-24
2011
11          Clothes       Offline              H 2014-08-02
2014
12          Clothes        Online              L 2017-01-13
2017
13        Household       Offline              H 2017-02-08
2017
14    Personal Care       Offline              C 2014-02-19
2014
15          Clothes        Online              M 2012-04-23
2012
16        Cosmetics       Offline              M 2016-11-19
2016
17        Beverages       Offline              C 2015-04-01
2015
18        Household       Offline              L 2010-12-30
2010
19             Meat        Online              L 2012-07-31
2012
20        Baby Food        Online              L 2014-05-14
2014
21        Baby Food        Online              H 2015-07-31
2015
22           Snacks        Online              L 2016-06-30
```

```
2016
23           Fruits        Online              H 2014-09-08
2014
24    Personal Care        Online              L 2016-05-07
2016
25        Cosmetics        Online              H 2017-05-22
2017
26           Fruits        Online              M 2014-10-13
2014
27           Fruits        Online              L 2010-05-07
2010
28        Beverages       Offline              C 2014-07-18
2014
29        Household       Offline              L 2012-05-26
2012
30        Cosmetics       Offline              M 2012-09-17
2012
31    Personal Care       Offline              C 2013-12-29
2013
32  Office Supplies        Online              C 2015-10-27
2015
33        Household       Offline              H 2015-01-16
2015
34           Snacks        Online              M 2017-02-25
2017
35    Personal Care       Offline              L 2017-05-08
2017
36           Fruits        Online              L 2011-11-22
2011
37             Meat        Online              M 2017-01-14
2017
38  Office Supplies        Online              L 2012-04-01
2012
39  Office Supplies        Online              M 2012-02-16
2012
40    Personal Care        Online              H 2017-03-11
2017
41        Cosmetics        Online              M 2010-02-06
2010
42           Cereal       Offline              H 2012-06-07
2012
43       Vegetables        Online              H 2012-10-06
2012
44          Clothes        Online              H 2015-11-14
2015
45           Cereal       Offline              H 2016-03-29
2016
46        Cosmetics        Online              C 2016-12-31
2016
```

```
47    Personal Care        Online              M 2010-12-23
2010
48          Clothes       Offline             C 2014-10-14
2014
49  Office Supplies       Offline             C 2012-01-11
2012
50          Clothes        Online             C 2010-02-02
2010
51           Fruits        Online             L 2013-08-18
2013
52           Cereal        Online             M 2013-03-25
2013
53  Office Supplies       Offline             M 2011-11-26
2011
54           Fruits       Offline             H 2013-09-17
2013
55          Clothes        Online             C 2012-06-08
2012
56          Clothes       Offline             C 2010-06-30
2010
57        Cosmetics       Offline             H 2015-02-23
2015
58        Household        Online             L 2012-01-05
2012
59        Cosmetics       Offline             H 2014-04-07
2014
60           Cereal       Offline             H 2013-06-09
2013
61        Baby Food        Online             L 2013-06-26
2013
62  Office Supplies        Online             M 2011-11-07
2011
63          Clothes       Offline             H 2010-10-30
2010
64        Cosmetics       Offline             H 2013-10-13
2013
65        Cosmetics       Offline             H 2013-10-11
2013
66    Personal Care       Offline             L 2012-07-08
2012
67          Clothes       Offline             M 2016-07-25
2016
68  Office Supplies       Offline             H 2010-10-24
2010
69          Clothes       Offline             L 2015-04-25
2015
70  Office Supplies        Online             M 2013-04-23
2013
71           Fruits        Online             L 2015-08-14
```

```
2015
72        Beverages        Online              C 2011-05-26
2011
73           Cereal        Online              H 2017-05-20
2017
74        Cosmetics       Offline              L 2013-07-05
2013
75        Household       Offline              C 2014-11-06
2014
76        Beverages        Online              C 2014-10-28
2014
77       Vegetables       Offline              C 2011-09-15
2011
78        Baby Food       Offline              H 2012-05-29
2012
79        Cosmetics        Online              H 2013-07-20
2013
80        Household       Offline              L 2012-10-21
2012
81          Clothes        Online              L 2012-09-18
2012
82        Cosmetics        Online              H 2016-11-15
2016
83           Snacks        Online              L 2011-01-04
2011
84       Vegetables        Online              L 2012-03-18
2012
85    Personal Care       Offline              L 2012-02-17
2012
86        Beverages       Offline              C 2011-01-16
2011
87        Baby Food       Offline              M 2014-02-03
2014
88           Fruits        Online              M 2012-04-30
2012
89        Beverages       Offline              C 2016-10-23
2016
90  Office Supplies       Offline              H 2016-12-06
2016
91        Beverages       Offline              H 2014-07-07
2014
92  Office Supplies        Online              M 2012-06-13
2012
93        Cosmetics        Online              H 2010-11-26
2010
94        Beverages       Offline              C 2011-02-08
2011
95          Clothes        Online              M 2011-07-26
2011
```

```
96           Fruits       Offline              L 2011-11-11
2011
97       Vegetables       Offline              C 2016-06-01
2016
98    Personal Care       Offline              M 2015-07-30
2015
99        Household       Offline              L 2012-02-10
2012

    Order Quarter  Order Month   Order ID  Ship Date  Units Sold  Unit
Price  \
0               2            5  669165933 2010-06-27        9925
255.28
1               3            8  963881480 2012-09-15        2804
205.70
2               2            5  341417157 2014-05-08        1779
651.21
3               2            6  514321792 2014-07-05        8102
9.33
4               1            2  115456712 2013-02-06        5062
651.21
5               1            2  547995746 2015-02-21        2974
255.28
6               2            4  135425221 2011-04-27        4187
668.27
7               3            7  871543967 2012-07-27        8082
154.06
8               3            7  770463311 2015-08-25        6070
81.73
9               2            4  616607081 2014-05-30        6593
205.70
10              2            6  814711606 2011-07-12         124
154.06
11              3            8  939825713 2014-08-19        4168
109.28
12              1            1  187310731 2017-03-01        8263
109.28
13              1            2  522840487 2017-02-13        8974
668.27
14              1            2  832401311 2014-02-23        4901
81.73
15              2            4  972292029 2012-06-03        1673
109.28
16              4           11  419123971 2016-12-18        6952
437.20
17              2            4  519820964 2015-04-18        5430
47.45
18              4           12  441619336 2011-01-20        3830
668.27
```

```
19              3             7  322067916 2012-09-11        5908
421.89
20              2             5  819028031 2014-06-28        7450
255.28
21              3             7  860673511 2015-09-03        1273
255.28
22              2             6  795490682 2016-07-26        2225
152.58
23              3             9  142278373 2014-10-04        2187
9.33
24              2             5  740147912 2016-05-10        5070
81.73
25              2             5  898523128 2017-06-05        1815
437.20
26              4            10  347140347 2014-11-10        5398
9.33
27              2             5  686048400 2010-05-10        5822
9.33
28              3             7  435608613 2014-07-30        5124
47.45
29              2             5  886494815 2012-06-09        2370
668.27
30              3             9  249693334 2012-10-20        8661
437.20
31              4            12  406502997 2014-01-28        2125
81.73
32              4            10  158535134 2015-11-25        2924
651.21
33              1             1  177713572 2015-03-01        8250
668.27
34              1             2  756274640 2017-02-25        7327
152.58
35              2             5  456767165 2017-05-21        6409
81.73
36              4            11  162052476 2011-12-03        3784
9.33
37              1             1  825304400 2017-01-23        4767
421.89
38              2             4  320009267 2012-05-08        6708
651.21
39              1             2  189965903 2012-02-28        3987
651.21
40              1             3  699285638 2017-03-28        3015
81.73
41              1             2  382392299 2010-02-25        7234
437.20
42              2             6  994022214 2012-06-08        2117
205.70
43              4            10  759224212 2012-11-10         171
154.06
```

```
44              4           11  223359620 2015-11-18        5930
109.28
45              1            3  902102267 2016-04-29         962
205.70
46              4           12  331438481 2016-12-31        8867
437.20
47              4           12  617667090 2011-01-31         273
81.73
48              4           10  787399423 2014-11-14        7842
109.28
49              1            1  837559306 2012-01-13        1266
651.21
50              1            2  385383069 2010-03-18        2269
109.28
51              3            8  918419539 2013-09-18        9606
9.33
52              1            3  844530045 2013-03-28        4063
205.70
53              4           11  441888415 2012-01-07        3457
651.21
54              3            9  508980977 2013-10-24        7637
9.33
55              2            6  114606559 2012-06-27        3482
109.28
56              2            6  647876489 2010-08-01        9905
109.28
57              1            2  868214595 2015-03-02        2847
437.20
58              1            1  955357205 2012-02-14         282
668.27
59              2            4  259353148 2014-04-19        7215
437.20
60              2            6  450563752 2013-07-02         682
205.70
61              2            6  569662845 2013-07-01        4750
255.28
62              4           11  177636754 2011-11-15        5518
651.21
63              4           10  705784308 2010-11-17        6116
109.28
64              4           10  505716836 2013-11-16        1705
437.20
65              4           10  699358165 2013-11-25        4477
437.20
66              3            7  228944623 2012-07-09        8656
81.73
67              3            7  807025039 2016-09-07        5498
109.28
68              4           10  166460740 2010-11-17        8287
```

```
651.21
69              2            4  610425555 2015-05-28        7342
109.28
70              2            4  462405812 2013-05-20        5010
651.21
71              3            8  816200339 2015-09-30         673
9.33
72              2            5  585920464 2011-07-15        5741
47.45
73              2            5  555990016 2017-06-17        8656
205.70
74              3            7  231145322 2013-08-16        9892
437.20
75              4           11  986435210 2014-12-12        6954
668.27
76              4           10  217221009 2014-11-15        9379
47.45
77              3            9  789176547 2011-10-23        3732
154.06
78              2            5  688288152 2012-06-02        8614
255.28
79              3            7  670854651 2013-08-07        9654
437.20
80              4           10  213487374 2012-11-30        4513
668.27
81              3            9  663110148 2012-10-08        7884
109.28
82              4           11  286959302 2016-12-08        6489
437.20
83              1            1  122583663 2011-01-05        4085
152.58
84              1            3  827844560 2012-04-07        6457
154.06
85              1            2  430915820 2012-03-20        6422
81.73
86              1            1  180283772 2011-01-21        8829
47.45
87              1            2  494747245 2014-03-20        5559
255.28
88              2            4  513417565 2012-05-18         522
9.33
89              4           10  345718562 2016-11-25        4660
47.45
90              4           12  621386563 2016-12-14         948
651.21
91              3            7  240470397 2014-07-11        9389
47.45
92              2            6  423331391 2012-07-24        2021
651.21
```

```
93               4           11  660643374 2010-12-25        7910
437.20
94               1            2  963392674 2011-03-21        8156
47.45
95               3            7  512878119 2011-09-03         888
109.28
96               4           11  810711038 2011-12-28        6267
9.33
97               2            6  728815257 2016-06-29        1485
154.06
98               3            7  559427106 2015-08-08        5767
81.73
99               1            2  665095412 2012-02-15        5367
668.27

    Unit Cost  Total Revenue  Total Cost  Total Profit  Days
Difference
0      159.42     2533654.00  1582243.50     951410.50
30
1      117.11      576782.80   328376.44     248406.36
24
2      524.96     1158502.59   933903.84     224598.75
6
3        6.92       75591.66    56065.84      19525.82
15
4      524.96     3296425.02  2657347.52     639077.50
5
5      159.42      759202.72   474115.08     285087.64
17
6      502.54     2798046.49  2104134.98     693911.51
4
7       90.93     1245112.92   734896.26     510216.66
10
8       56.67      496101.10   343986.90     152114.20
42
9      117.11     1356180.10   772106.23     584073.87
42
10      90.93       19103.44    11275.32       7828.12
18
11      35.84      455479.04   149381.12     306097.92
17
12      35.84      902980.64   296145.92     606834.72
47
13     502.54     5997054.98  4509793.96    1487261.02
5
14      56.67      400558.73   277739.67     122819.06
4
15      35.84      182825.44    59960.32     122865.12
41
```

16	263.33	3039414.40	1830670.16	1208744.24
29				
17	31.79	257653.50	172619.70	85033.80
17				
18	502.54	2559474.10	1924728.20	634745.90
21				
19	364.69	2492526.12	2154588.52	337937.60
42				
20	159.42	1901836.00	1187679.00	714157.00
45				
21	159.42	324971.44	202941.66	122029.78
34				
22	97.44	339490.50	216804.00	122686.50
26				
23	6.92	20404.71	15134.04	5270.67
26				
24	56.67	414371.10	287316.90	127054.20
3				
25	263.33	793518.00	477943.95	315574.05
14				
26	6.92	50363.34	37354.16	13009.18
28				
27	6.92	54319.26	40288.24	14031.02
3				
28	31.79	243133.80	162891.96	80241.84
12				
29	502.54	1583799.90	1191019.80	392780.10
14				
30	263.33	3786589.20	2280701.13	1505888.07
33				
31	56.67	173676.25	120423.75	53252.50
30				
32	524.96	1904138.04	1534983.04	369155.00
29				
33	502.54	5513227.50	4145955.00	1367272.50
44				
34	97.44	1117953.66	713942.88	404010.78
0				
35	56.67	523807.57	363198.03	160609.54
13				
36	6.92	35304.72	26185.28	9119.44
11				
37	364.69	2011149.63	1738477.23	272672.40
9				
38	524.96	4368316.68	3521431.68	846885.00
37				
39	524.96	2596374.27	2093015.52	503358.75
12				
40	56.67	246415.95	170860.05	75555.90

```
17
41     263.33     3162704.80  1904929.22    1257775.58
19
42     117.11      435466.90   247921.87     187545.03
1
43      90.93       26344.26    15549.03      10795.23
35
44      35.84      648030.40   212531.20     435499.20
4
45     117.11      197883.40   112659.82      85223.58
31
46     263.33     3876652.40  2334947.11    1541705.29
0
47      56.67       22312.29    15470.91       6841.38
39
48      35.84      856973.76   281057.28     575916.48
31
49     524.96      824431.86   664599.36     159832.50
2
50      35.84      247956.32    81320.96     166635.36
44
51       6.92       89623.98    66473.52      23150.46
31
52     117.11      835759.10   475817.93     359941.17
3
53     524.96     2251232.97  1814786.72     436446.25
42
54       6.92       71253.21    52848.04      18405.17
37
55      35.84      380512.96   124794.88     255718.08
19
56      35.84     1082418.40   354995.20     727423.20
32
57     263.33     1244708.40   749700.51     495007.89
7
58     502.54      188452.14   141716.28      46735.86
40
59     263.33     3154398.00  1899925.95    1254472.05
12
60     117.11      140287.40    79869.02      60418.38
23
61     159.42     1212580.00   757245.00     455335.00
5
62     524.96     3593376.78  2896729.28     696647.50
8
63      35.84      668356.48   219197.44     449159.04
18
64     263.33      745426.00   448977.65     296448.35
34
```

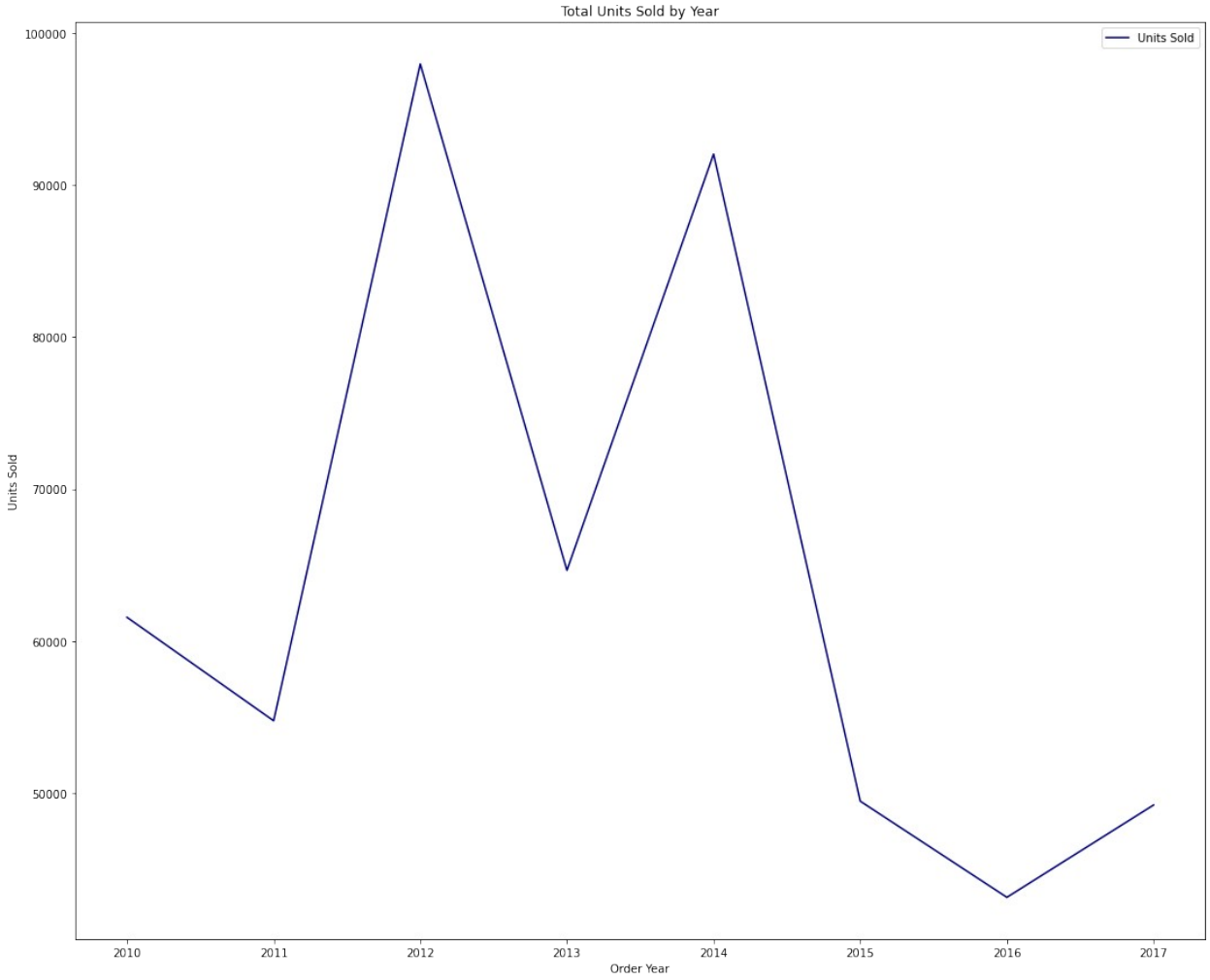
65 263.33 1957344.40 1178928.41 778415.99
45
66 56.67 707454.88 490535.52 216919.36
1
67 35.84 600821.44 197048.32 403773.12
44
68 524.96 5396577.27 4350343.52 1046233.75
24
69 35.84 802333.76 263137.28 539196.48
33
70 524.96 3262562.10 2630049.60 632512.50
27
71 6.92 6279.09 4657.16 1621.93
47
72 31.79 272410.45 182506.39 89904.06
50
73 117.11 1780539.20 1013704.16 766835.04
28
74 263.33 4324782.40 2604860.36 1719922.04
42
75 502.54 4647149.58 3494663.16 1152486.42
36
76 31.79 445033.55 298158.41 146875.14
18
77 90.93 574951.92 339350.76 235601.16
38
78 159.42 2198981.92 1373243.88 825738.04
4
79 263.33 4220728.80 2542187.82 1678540.98
18
80 502.54 3015902.51 2267963.02 747939.49
40
81 35.84 861563.52 282562.56 579000.96
20
82 263.33 2836990.80 1708748.37 1128242.43
23
83 97.44 623289.30 398042.40 225246.90
1
84 90.93 994765.42 587135.01 407630.41
20
85 56.67 524870.06 363934.74 160935.32
32
86 31.79 418936.05 280673.91 138262.14
5
87 159.42 1419101.52 886215.78 532885.74
45
88 6.92 4870.26 3612.24 1258.02
18
89 31.79 221117.00 148141.40 72975.60

```
33
90     524.96      617347.08   497662.08     119685.00
8
91      31.79      445508.05   298476.31     147031.74
4
92     524.96     1316095.41  1060944.16     255151.25
41
93     263.33     3458252.00  2082940.30    1375311.70
29
94      31.79      387002.20   259279.24     127722.96
41
95      35.84       97040.64    31825.92      65214.72
39
96       6.92       58471.11    43367.64      15103.47
47
97      90.93      228779.10   135031.05      93748.05
28
98      56.67      471336.91   326815.89     144521.02
9
99     502.54     3586605.09  2697132.18     889472.91
5
```

```
df_9 = inp1.groupby(['Order Year'])[['Units Sold']].sum()
df_9 = df_9.round(2)
print(df_9)
```

```
            Units Sold
Order Year
2010             61571
2011             54768
2012             97967
2013             64663
2014             92040
2015             49480
2016             43156
2017             49226
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_9.plot(kind='line',color=['Navy'],ax=ax)
plt.title('Total Units Sold by Year')
plt.xlabel('Order Year')
plt.ylabel('Units Sold')
plt.legend(loc='upper right');
```

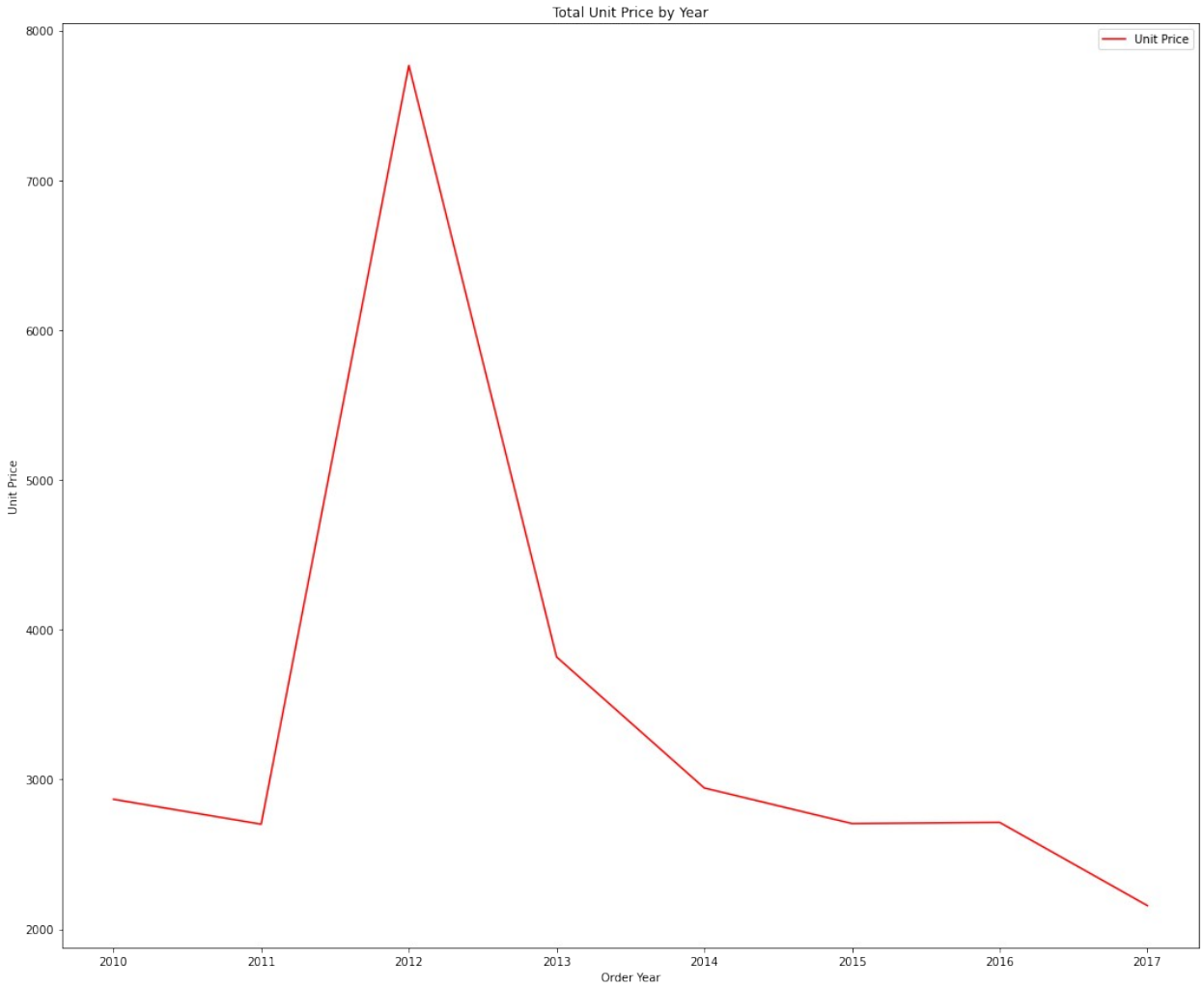



```
# In Year '2010' maximum number of units were sold '61571'.

df_10 = inp1.groupby(['Order Year'])[['Unit Price']].sum()
df_10 = df_10.round(2)
print(df_10)
```

```
            Unit Price
Order Year
2010           2868.06
2011           2701.68
2012           7766.50
2013           3818.29
2014           2943.57
2015           2706.04
2016           2713.61
2017           2158.38
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_10.plot(kind='line',color=['red'],ax=ax)
plt.title('Total Unit Price by Year')
```

```
plt.xlabel('Order Year')
plt.ylabel('Unit Price')
plt.legend(loc='upper right');
```

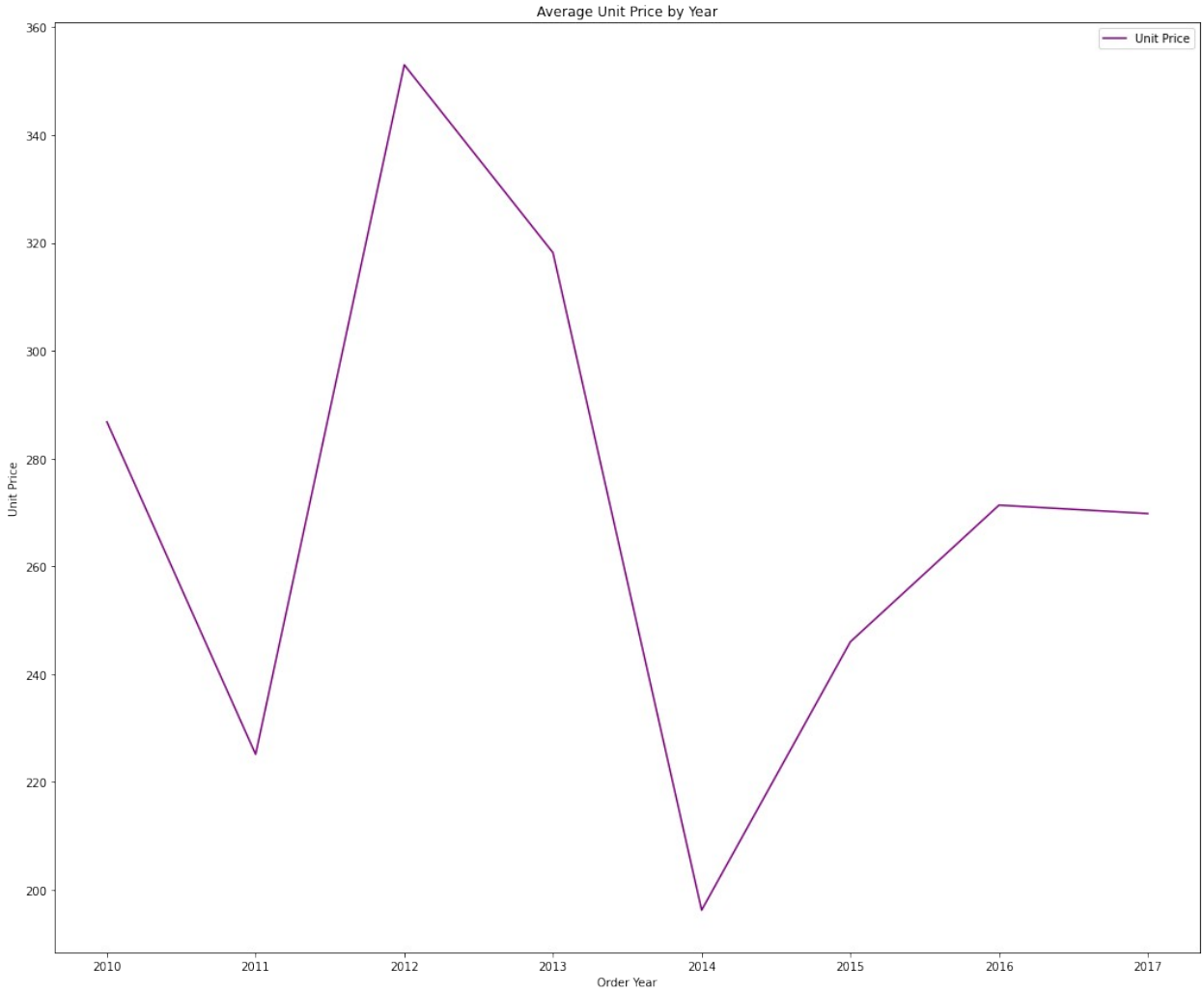



```
# Year '2010' has the maximum consolidated 'Unit Price' of '2868.06'.

df_10 = inp1.groupby(['Order Year'])[['Unit Price']].mean()
df_10 = df_10.round(2)
print(df_10)
```

```
            Unit Price
Order Year
2010            286.81
2011            225.14
2012            353.02
2013            318.19
2014            196.24
2015            246.00
```

```
2016            271.36
2017            269.80
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_10.plot(kind='line',color=['Purple'],ax=ax)
plt.title('Average Unit Price by Year')
plt.xlabel('Order Year')
plt.ylabel('Unit Price')
plt.legend(loc='upper right');
```

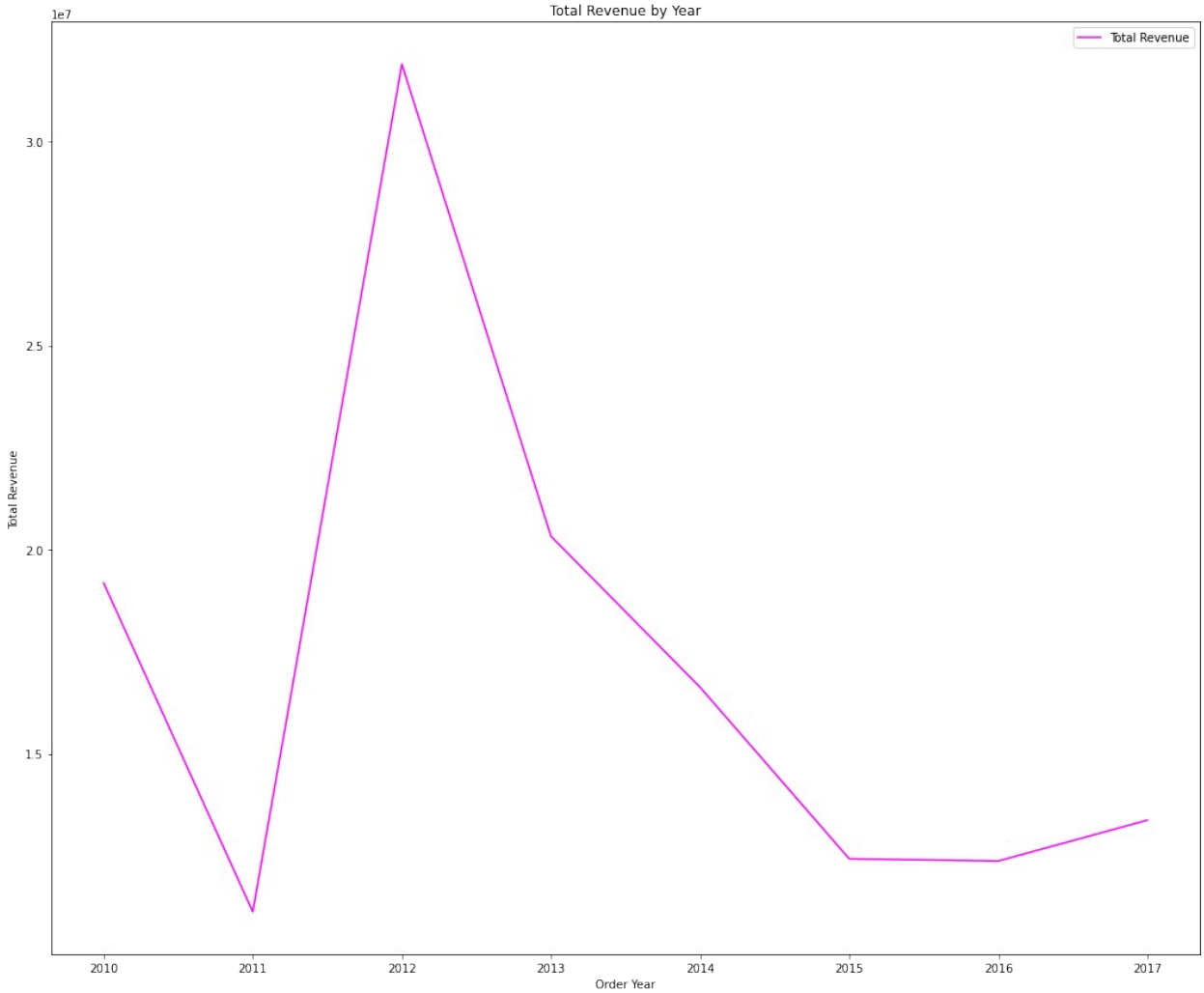



```
# Year '2010' has an average consolidated 'Unit Price' of '286.81'.

df_11 = inp1.groupby(['Order Year'])[['Total Revenue']].sum()
df_11 = df_11.round(2)
print(df_11)
```

```
            Total Revenue
Order Year
```

```
2010          19186024.92
2011          11129166.07
2012          31898644.52
2013          20330448.66
2014          16630214.43
2015          12427982.86
2016          12372867.22
2017          13373419.63
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_11.plot(kind='line',color=['Magenta'],ax=ax)
plt.title('Total Revenue by Year')
plt.xlabel('Order Year')
plt.ylabel('Total Revenue')
plt.legend(loc='upper right');
```

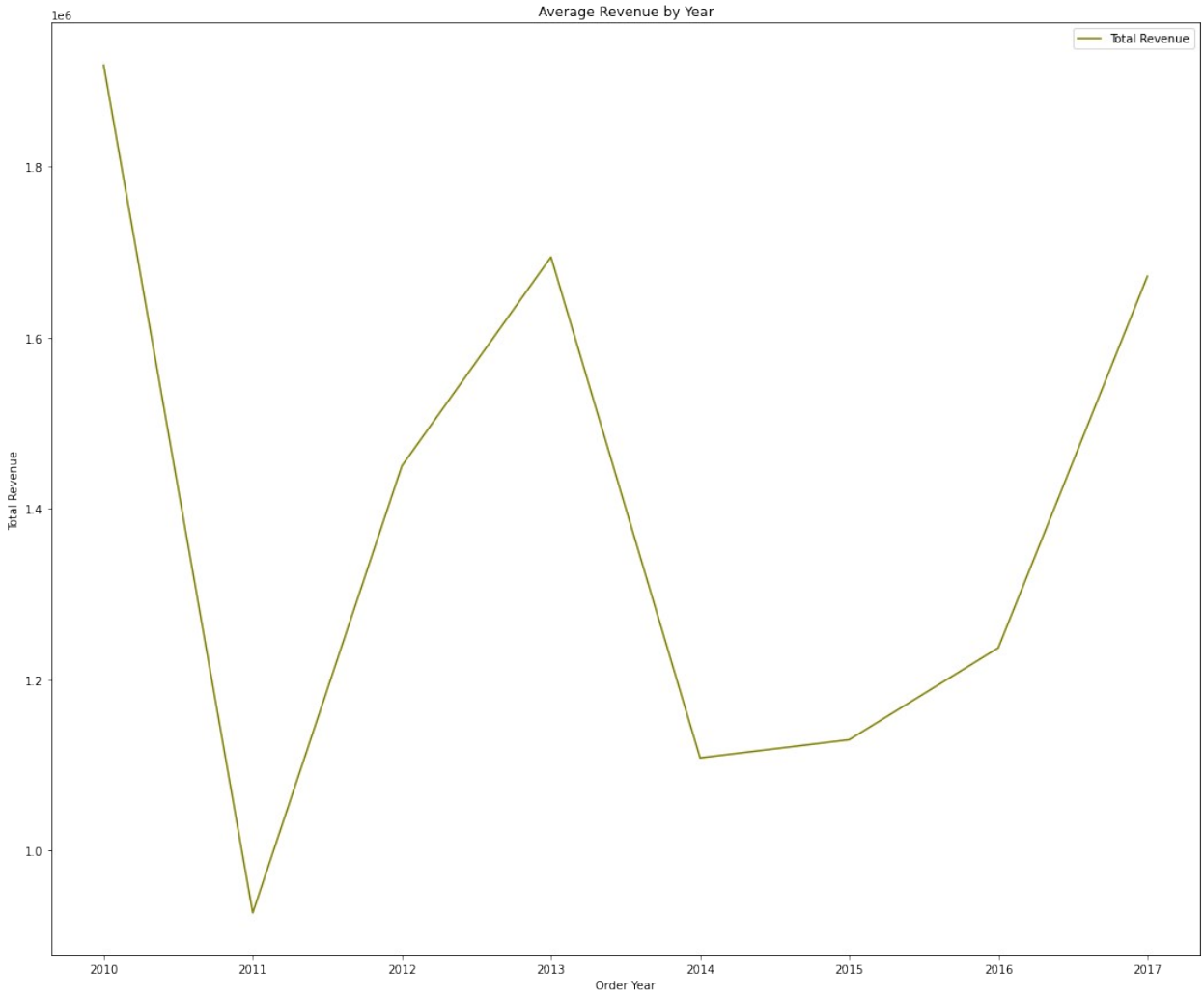



```
# Year '2010' has the maximum consolidated 'Total Revenue' of
'19186024.92'.
```

```
df_11 = inp1.groupby(['Order Year'])[['Total Revenue']].mean()
df_11 = df_11.round(2)
print(df_11)
```

```
            Total Revenue
Order Year
2010           1918602.49
2011            927430.51
2012           1449938.39
2013           1694204.06
2014           1108680.96
2015           1129816.62
2016           1237286.72
2017           1671677.45
```

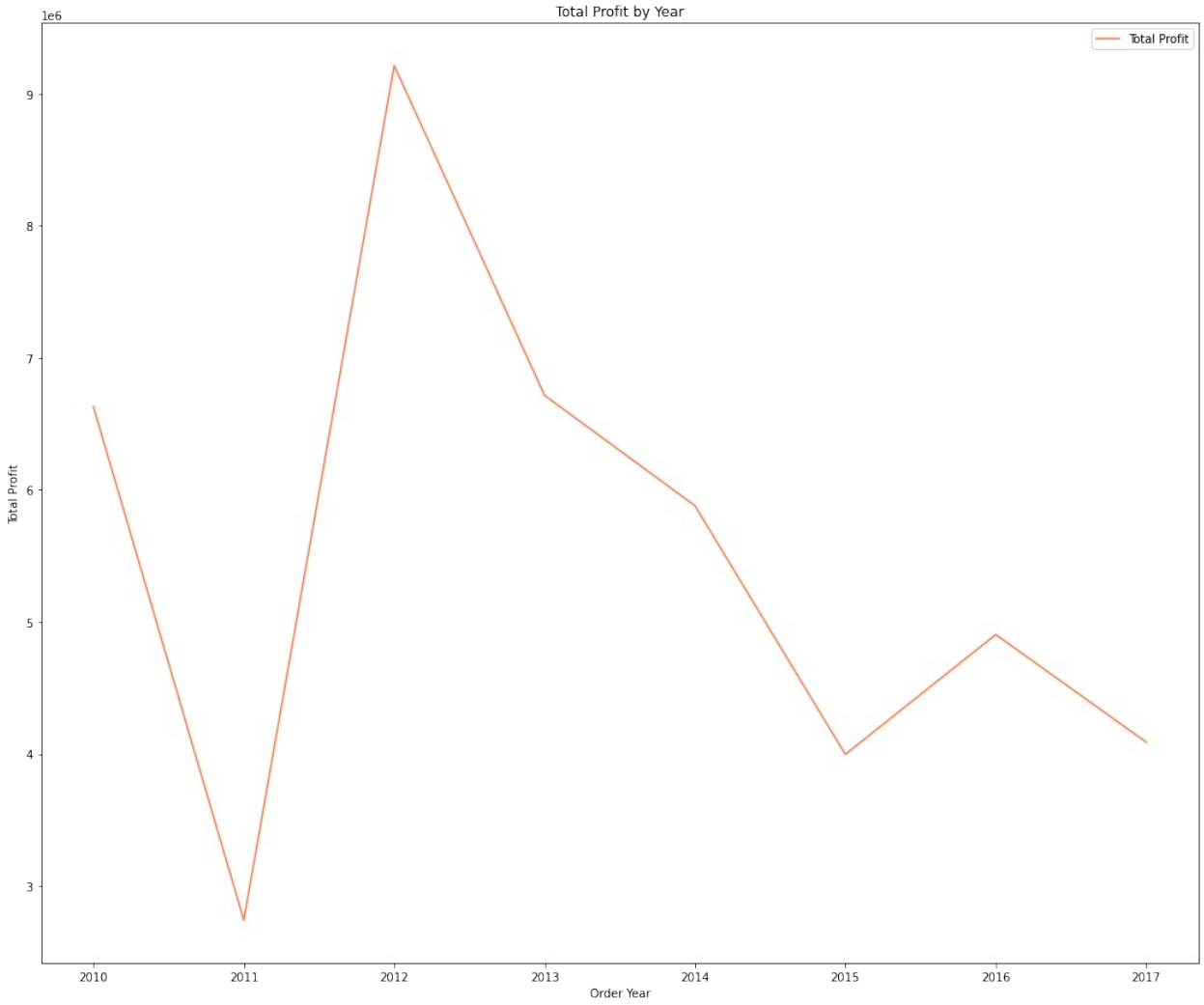
```
fig, ax = plt.subplots(figsize=(18, 15))
df_11.plot(kind='line',color=['Olive'],ax=ax)
plt.title('Average Revenue by Year')
plt.xlabel('Order Year')
plt.ylabel('Total Revenue')
plt.legend(loc='upper right');
```




```
# Year '2010' has an average consolidated 'Total Revenue' of
'1918602.49'.

df_12 = inp1.groupby(['Order Year'])[['Total Profit']].sum()
df_12 = df_12.round(2)
print(df_12)
```

```
            Total Profit
Order Year
2010          6629567.43
2011          2741008.23
2012          9213010.12
2013          6715420.04
2014          5879461.68
2015          3996539.44
2016          4903838.01
2017          4089353.45
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_12.plot(kind='line',color=['Coral'],ax=ax)
plt.title('Total Profit by Year')
plt.xlabel('Order Year')
plt.ylabel('Total Profit')
plt.legend(loc='upper right');
```

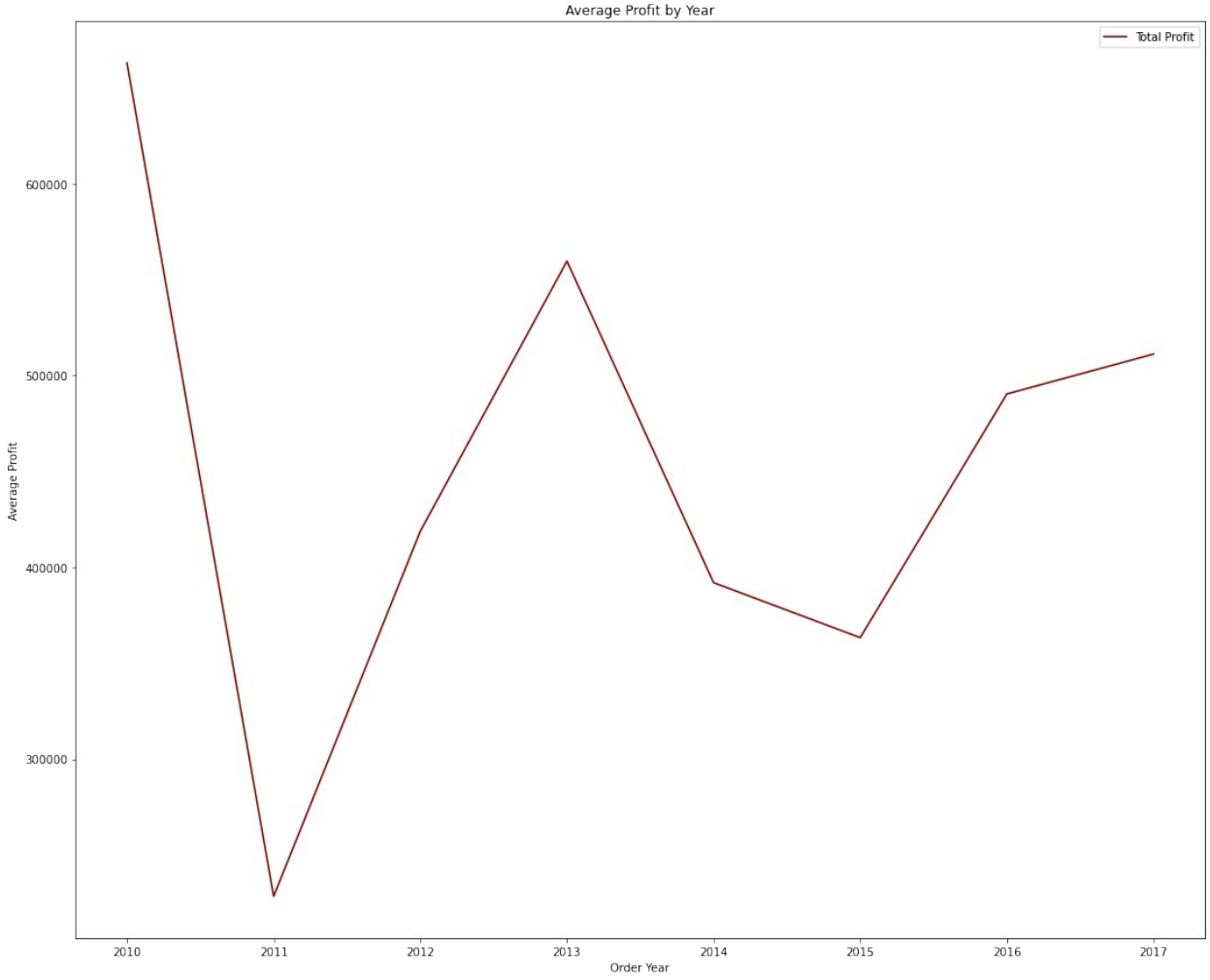



```
# Year '2012' has the maximum consolidated 'Total Profit' of
'9213010.12'.

df_12 = inp1.groupby(['Order Year'])[['Total Profit']].mean()
df_12 = df_12.round(2)
print(df_12)
```

```
            Total Profit
Order Year
2010          662956.74
2011          228417.35
```

```
2012            418773.19
2013            559618.34
2014            391964.11
2015            363321.77
2016            490383.80
2017            511169.18
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_12.plot(kind='line',color=['Maroon'],ax=ax)
plt.title('Average Profit by Year')
plt.xlabel('Order Year')
plt.ylabel('Average Profit')
plt.legend(loc='upper right');
```

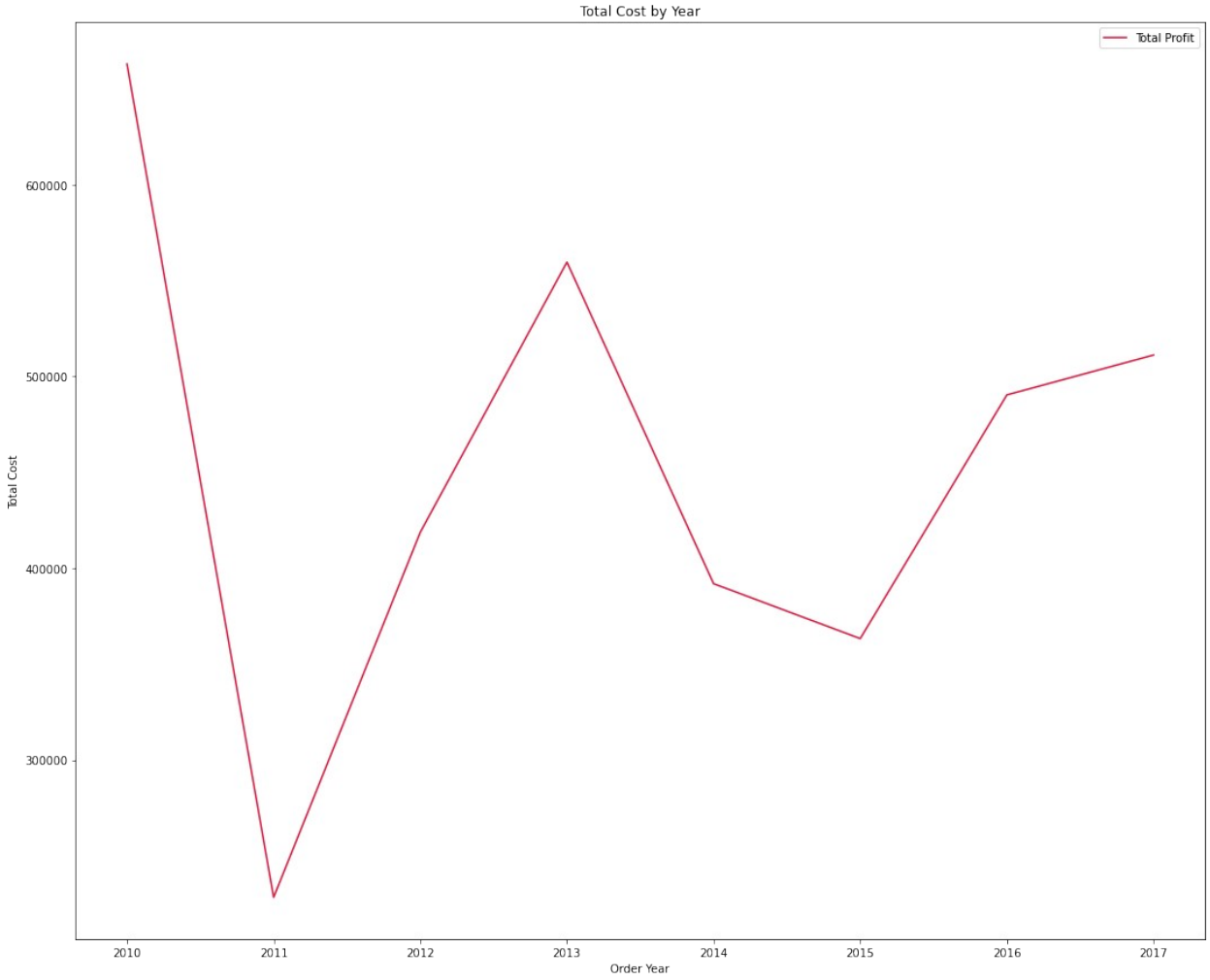



```
# Year '2010' has the highest average consolidated 'Total Profit' of
'662956.74'.
```

```
df_13 = inp1.groupby(['Order Year'])[['Total Cost']].sum()
df_13 = df_13.round(2)
print(df_13)
```

```
              Total Cost
Order Year
2010        12556457.49
2011         8388157.84
2012        22685634.40
2013        13615028.62
2014        10750752.75
2015         8431443.42
2016         7469029.21
2017         9284066.18
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_12.plot(kind='line',color=['Crimson'],ax=ax)
plt.title('Total Cost by Year')
plt.xlabel('Order Year')
plt.ylabel('Total Cost')
plt.legend(loc='upper right');
```

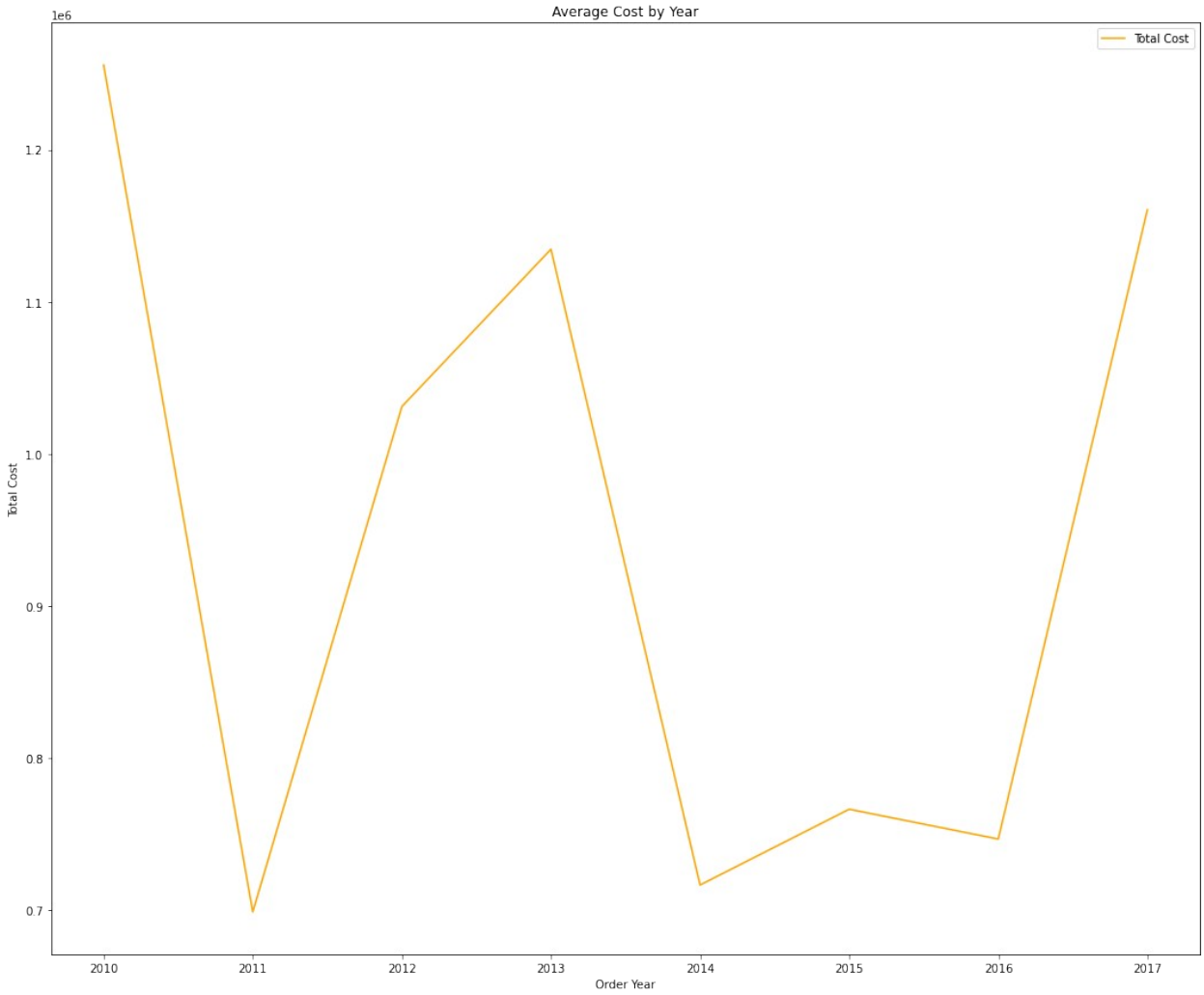



```
# Year '2012' has the maximum consolidated 'Total Cost' of
'22685634.40'.

df_13 = inp1.groupby(['Order Year'])[['Total Cost']].mean()
df_13 = df_13.round(2)
print(df_13)
```

```
            Total Cost
Order Year
2010        1255645.75
2011         699013.15
2012        1031165.20
2013        1134585.72
2014         716716.85
2015         766494.86
2016         746902.92
2017        1160508.27
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_13.plot(kind='line',color=['Orange'],ax=ax)
```

```
plt.title('Average Cost by Year')
plt.xlabel('Order Year')
plt.ylabel('Total Cost')
plt.legend(loc='upper right');
```

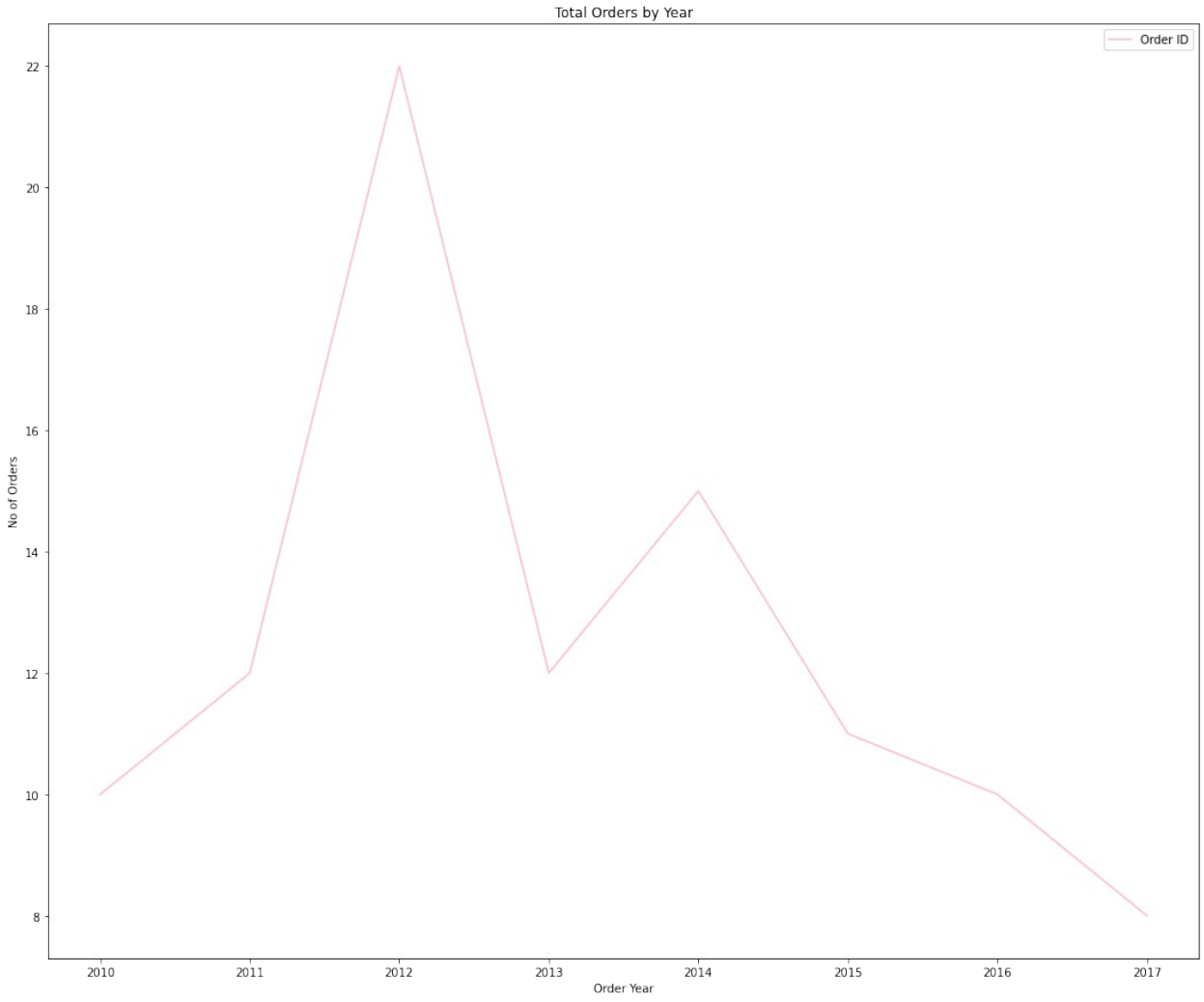



```
# Year '2010' has the highest average consolidated 'Total Cost' of
'1255645.75'.

df_14 = inp1.groupby(['Order Year'])[['Order ID']].count()
df_14 = df_14.round(2)
print(df_14)
```

```
            Order ID
Order Year
2010              10
2011              12
2012              22
2013              12
```

```
2014                15
2015                11
2016                10
2017                 8
```

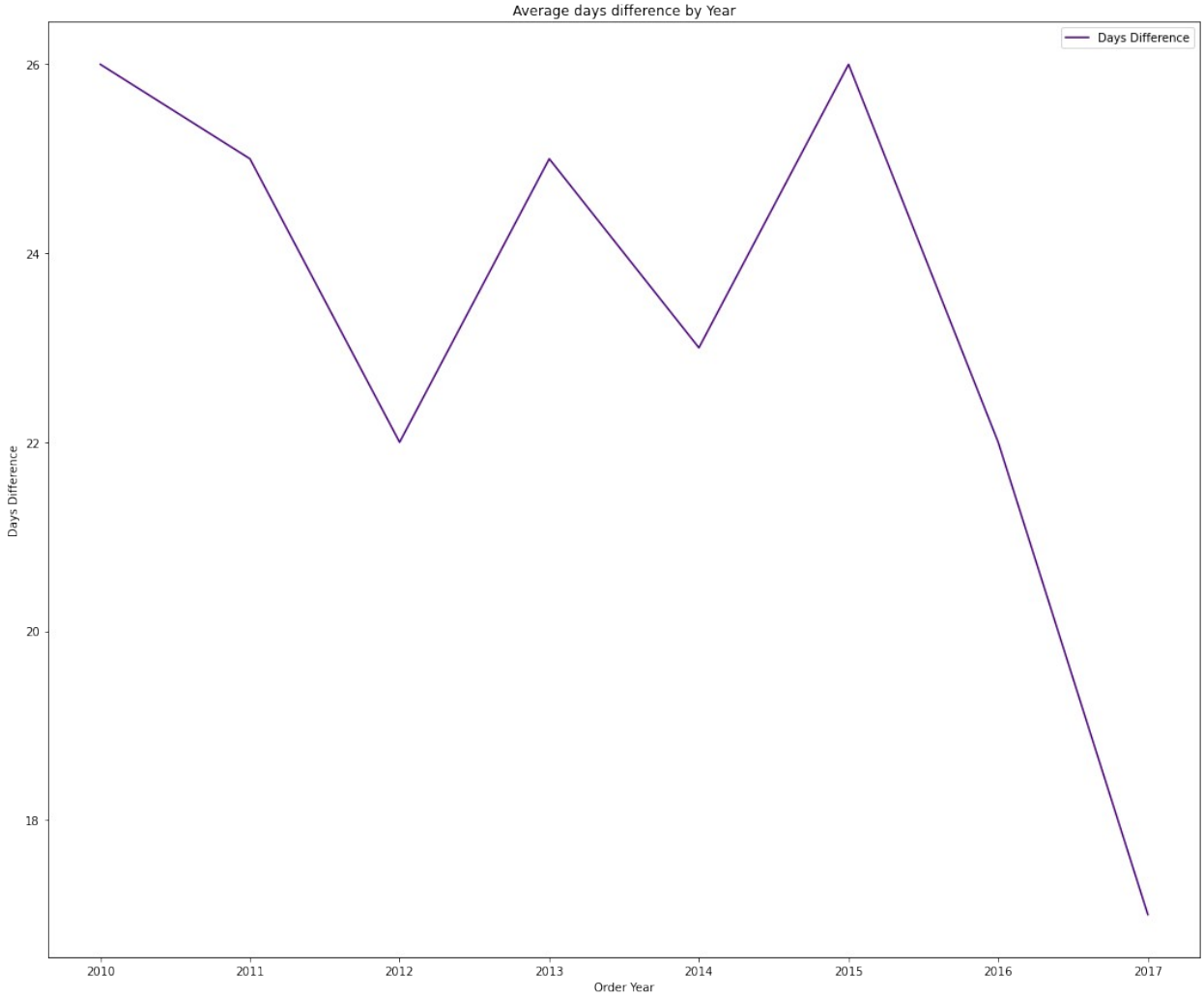
```
fig, ax = plt.subplots(figsize=(18, 15))
df_14.plot(kind='line',color=['Pink'],ax=ax)
plt.title('Total Orders by Year')
plt.xlabel('Order Year')
plt.ylabel('No of Orders')
plt.legend(loc='upper right');
```




```
# Year '2012' has the maximum number of Orders'22'.

df_15 = inp1.groupby(['Order Year'])[['Days Difference']].mean()
df_15 = df_15.round(0)
print(df_15)
```

```
            Days Difference
Order Year
2010                   26.0
2011                   25.0
2012                   22.0
2013                   25.0
2014                   23.0
2015                   26.0
2016                   22.0
2017                   17.0
```

```
fig, ax = plt.subplots(figsize=(18, 15))
df_15.plot(kind='line',color=['Indigo'],ax=ax)
plt.title('Average days difference by Year')
plt.xlabel('Order Year')
plt.ylabel('Days Difference')
plt.legend(loc='upper right');
```



```
# Average number of days difference between the 'Order date' & 'Ship
date' was highest in 2010 & 2015 with '26' days.

df_2010 = inp1[inp1['Order Year'] == 2010]

df_grouped = df_2010.groupby(['Region','Country','Sales
Channel','Order Priority','Order Year','Order Quarter','Order
Month','Units Sold','Item Type'])['Total Revenue','Total
Profit'].sum().reset_index()

df_sorted = df_grouped.sort_values(by='Total Profit', ascending=False)

print(df_sorted)
```

```
                          Region       Country Sales Channel Order
Priority  \
5                         Europe       Romania        Online
H
7  Middle East and North Africa    Azerbaijan        Online
M
4                         Europe     Lithuania       Offline
H
2          Australia and Oceania        Tuvalu       Offline
H
1          Australia and Oceania          Fiji       Offline
C
0                           Asia  Turkmenistan       Offline
L
8  Middle East and North Africa         Libya       Offline
H
3                         Europe       Albania        Online
C
9             Sub-Saharan Africa          Mali        Online
L
6                         Europe   Switzerland        Online
M

   Order Year  Order Quarter  Order Month  Units Sold        Item Type
\
5        2010              4           11        7910        Cosmetics

7        2010              1            2        7234        Cosmetics

4        2010              4           10        8287  Office Supplies

2        2010              2            5        9925        Baby Food

1        2010              2            6        9905          Clothes

0        2010              4           12        3830        Household
```

```
8         2010               4            10         6116           Clothes

3         2010               1             2         2269           Clothes

9         2010               2             5         5822            Fruits

6         2010               4            12          273    Personal Care


   Total Revenue  Total Profit
5     3458252.00    1375311.70
7     3162704.80    1257775.58
4     5396577.27    1046233.75
2     2533654.00     951410.50
1     1082418.40     727423.20
0     2559474.10     634745.90
8      668356.48     449159.04
3      247956.32     166635.36
9       54319.26      14031.02
6       22312.29       6841.38
```

```
# In year '2010' ,Country 'Romania' Region'Europe' with item
type'Cosmetics' made the maximum Total Profit of '1375311.70'
# while the maximum highest Total Revenue of '5396577.27' was for
#Country 'Lithuania' Region 'Europe' with item type 'Office Supplies'.

df_2011 = inp1[inp1['Order Year'] == 2011]

df_grouped = df_2011.groupby(['Region','Country','Sales
Channel','Order Priority','Order Year','Order Quarter','Order
Month','Units Sold','Item Type'])['Total Revenue','Total
Profit'].sum().reset_index()

df_sorted = df_grouped.sort_values(by='Total Profit', ascending=False)

print(df_sorted)
```

```
                                Region
Country  \
6                 Sub-Saharan Africa
Cameroon
5                 Sub-Saharan Africa
Angola
10                Sub-Saharan Africa                      Sierra
Leone
1                               Asia
Laos
11                Sub-Saharan Africa
Zambia
9                 Sub-Saharan Africa             Sao Tome and
Principe
```

```
3   Central America and the Caribbean
Nicaragua
7                   Sub-Saharan Africa  Democratic Republic of the
Congo
8                   Sub-Saharan Africa
Mali
2                                 Asia
Malaysia
4         Middle East and North Africa
Syria
0                                 Asia
Kyrgyzstan

   Sales Channel Order Priority  Order Year  Order Quarter  Order
Month  \
6          Online              M        2011              4
11
5         Offline              M        2011              2
4
10        Offline              M        2011              4
11
1         Offline              C        2011              3
9
11         Online              L        2011              1
1
9         Offline              C        2011              1
1
3         Offline              C        2011              1
2
7          Online              C        2011              2
5
8          Online              M        2011              3
7
2         Offline              L        2011              4
11
4          Online              L        2011              4
11
0          Online              H        2011              2
6

    Units Sold        Item Type  Total Revenue  Total Profit
6          5518  Office Supplies     3593376.78     696647.50
5          4187        Household     2798046.49     693911.51
10         3457  Office Supplies     2251232.97     436446.25
1          3732       Vegetables      574951.92     235601.16
11         4085           Snacks      623289.30     225246.90
9          8829        Beverages      418936.05     138262.14
3          8156        Beverages      387002.20     127722.96
7          5741        Beverages      272410.45      89904.06
```

```
8          888          Clothes       97040.64      65214.72
2         6267           Fruits       58471.11      15103.47
4         3784           Fruits       35304.72       9119.44
0          124       Vegetables       19103.44       7828.12
```

```
# In year '2011' ,Country 'Cameroon' Region 'Sub-Saharan Africa ' with
item type 'Office Supplies'
# made the maximum Total Profit of '696647.50 & Total Revenue of
'3593376.78'.

df_2012 = inp1[inp1['Order Year']==2012]

df_grouped = df_2012.groupby(['Region','Country','Sales
Channel','Order Priority','Order Year','Order Quarter','Order
Month','Units Sold','Item Type'])['Total Revenue','Total
Profit'].sum().reset_index()

df_sorted = df_grouped.sort_values(by='Total Profit', ascending=False)

print(df_sorted)
```

```
                                Region         Country Sales Channel  \
8                               Europe     Switzerland       Offline
19                 Sub-Saharan Africa      Mozambique       Offline
0                                Asia          Brunei        Online
5                               Europe          Monaco       Offline
7                               Europe           Spain       Offline
12       Middle East and North Africa         Lebanon        Online
14                 Sub-Saharan Africa    Burkina Faso        Online
3                               Europe        Bulgaria        Online
17                 Sub-Saharan Africa           Kenya        Online
21                 Sub-Saharan Africa      The Gambia       Offline
1                Australia and Oceania      East Timor        Online
15                 Sub-Saharan Africa   Cote d'Ivoire        Online
10       Middle East and North Africa      Azerbaijan        Online
2   Central America and the Caribbean         Grenada        Online
16                 Sub-Saharan Africa           Gabon       Offline
20                 Sub-Saharan Africa      The Gambia       Offline
13                      North America          Mexico       Offline
18                 Sub-Saharan Africa      Mauritania       Offline
4                               Europe        Bulgaria        Online
9                               Europe  United Kingdom        Online
6                               Europe        Slovakia        Online
11       Middle East and North Africa          Kuwait        Online

   Order Priority  Order Year  Order Quarter  Order Month  Units Sold
\
8               M        2012              3            9        8661

19              L        2012              1            2        5367
```

0	L	2012	2	4	6708
5	H	2012	2	5	8614
7	L	2012	4	10	4513
12	L	2012	3	9	7884
14	H	2012	3	7	8082
3	M	2012	1	2	3987
17	L	2012	1	3	6457
21	L	2012	2	5	2370
1	L	2012	3	7	5908
15	C	2012	2	6	3482
10	M	2012	2	6	2021
2	C	2012	3	8	2804
16	L	2012	3	7	8656
20	H	2012	2	6	2117
13	L	2012	1	2	6422
18	C	2012	1	1	1266
4	M	2012	2	4	1673
9	L	2012	1	1	282
6	H	2012	4	10	171
11	M	2012	2	4	522

	Item Type	Total Revenue	Total Profit
8	Cosmetics	3786589.20	1505888.07
19	Household	3586605.09	889472.91
0	Office Supplies	4368316.68	846885.00
5	Baby Food	2198981.92	825738.04
7	Household	3015902.51	747939.49
12	Clothes	861563.52	579000.96
14	Vegetables	1245112.92	510216.66
3	Office Supplies	2596374.27	503358.75
17	Vegetables	994765.42	407630.41

```
21        Household     1583799.90     392780.10
1              Meat     2492526.12     337937.60
15          Clothes      380512.96     255718.08
10  Office Supplies     1316095.41     255151.25
2            Cereal      576782.80     248406.36
16    Personal Care      707454.88     216919.36
20           Cereal      435466.90     187545.03
13    Personal Care      524870.06     160935.32
18  Office Supplies      824431.86     159832.50
4           Clothes      182825.44     122865.12
9         Household      188452.14      46735.86
6        Vegetables       26344.26      10795.23
11           Fruits        4870.26       1258.02
```

```
# In year '2012' ,Country 'Switzerland' Region 'Europe' with item type
'Cosmetics'
# made the maximum Total Profit of '1505888.07' while the maximum
highest Total Revenue of '4368316.68' was for
#Country 'Brunei' Region 'Asia' with item type 'Office Supplies'.

df_2013 = inp1[inp1['Order Year']==2013]

df_grouped = df_2013.groupby(['Region','Country','Sales
Channel','Order Priority','Order Year','Order Quarter','Order
Month','Units Sold','Item Type'])['Total Revenue','Total
Profit'].sum().reset_index()

df_sorted = df_grouped.sort_values(by='Total Profit', ascending=False)

print(df_sorted)
```

```
                              Region                Country Sales
Channel  \
5        Middle East and North Africa               Pakistan
Offline
2               Australia and Oceania                  Samoa
Online
8                  Sub-Saharan Africa                 Rwanda
Offline
9                  Sub-Saharan Africa                 Rwanda
Offline
0                                Asia           Turkmenistan
Online
4                              Europe              San Marino
Online
6        Middle East and North Africa           Saudi Arabia
Online
3   Central America and the Caribbean                  Haiti
Offline
1               Australia and Oceania              Australia
Offline
```

```
11                  Sub-Saharan Africa            South Sudan
Offline
7                   Sub-Saharan Africa                Lesotho
Online
10                  Sub-Saharan Africa  Sao Tome and Principe
Offline

   Order Priority  Order Year  Order Quarter  Order Month  Units Sold
\
5               L        2013              3            7        9892

2               H        2013              3            7        9654

8               H        2013              4           10        4477

9               L        2013              1            2        5062

0               M        2013              2            4        5010

4               L        2013              2            6        4750

6               M        2013              1            3        4063

3               H        2013              4           10        1705

1               H        2013              2            6         682

11              C        2013              4           12        2125

7               L        2013              3            8        9606

10              H        2013              3            9        7637


          Item Type  Total Revenue  Total Profit
5         Cosmetics     4324782.40    1719922.04
2         Cosmetics     4220728.80    1678540.98
8         Cosmetics     1957344.40     778415.99
9   Office Supplies     3296425.02     639077.50
0   Office Supplies     3262562.10     632512.50
4         Baby Food     1212580.00     455335.00
6            Cereal      835759.10     359941.17
3         Cosmetics      745426.00     296448.35
1            Cereal      140287.40      60418.38
11    Personal Care      173676.25      53252.50
7            Fruits       89623.98      23150.46
10           Fruits       71253.21      18405.17
```

```
# In year '2013' ,Country 'Pakistan' Region 'Middle East and North
Africa' with item type 'Cosmetics'
```

```
# made the maximum Total Profit of '1719922.04' & Total Revenue of
'4324782.40'.

df_2014 = inp1[inp1['Order Year']==2014]

df_grouped = df_2014.groupby(['Region','Country','Sales
Channel','Order Priority','Order Year','Order Quarter','Order
Month','Units Sold','Item Type'])['Total Revenue','Total
Profit'].sum().reset_index()

df_sorted = df_grouped.sort_values(by='Total Profit', ascending=False)

print(df_sorted)
```

```
                  Region                            Country Sales
Channel  \
11     Sub-Saharan Africa                           Djibouti
Offline
9            North America                             Mexico
Offline
7                   Europe                             Norway
Online
13     Sub-Saharan Africa                            Senegal
Online
5                   Europe                           Macedonia
Offline
14     Sub-Saharan Africa                          The Gambia
Offline
10     Sub-Saharan Africa                          Cape Verde
Offline
8                   Europe                              Russia
Offline
1   Australia and Oceania                            Australia
Offline
2   Australia and Oceania  Federated States of Micronesia
Online
0                     Asia                            Mongolia
Offline
6                   Europe                             Norway
Offline
12     Sub-Saharan Africa             Sao Tome and Principe
Online
3   Australia and Oceania                            Kiribati
Online
4   Australia and Oceania                         New Zealand
Online

   Order Priority  Order Year  Order Quarter  Order Month  Units Sold
\
11              H        2014              2            4        7215
```

9	C	2014	4	11	6954
7	L	2014	2	5	7450
13	H	2014	2	4	6593
5	C	2014	4	10	7842
14	M	2014	1	2	5559
10	H	2014	3	8	4168
8	L	2014	2	5	1779
1	H	2014	3	7	9389
2	C	2014	4	10	9379
0	C	2014	1	2	4901
6	C	2014	3	7	5124
12	C	2014	2	6	8102
3	M	2014	4	10	5398
4	H	2014	3	9	2187

	Item Type	Total Revenue	Total Profit
11	Cosmetics	3154398.00	1254472.05
9	Household	4647149.58	1152486.42
7	Baby Food	1901836.00	714157.00
13	Cereal	1356180.10	584073.87
5	Clothes	856973.76	575916.48
14	Baby Food	1419101.52	532885.74
10	Clothes	455479.04	306097.92
8	Office Supplies	1158502.59	224598.75
1	Beverages	445508.05	147031.74
2	Beverages	445033.55	146875.14
0	Personal Care	400558.73	122819.06
6	Beverages	243133.80	80241.84
12	Fruits	75591.66	19525.82
3	Fruits	50363.34	13009.18
4	Fruits	20404.71	5270.67

```
# In year '2014' ,Country 'Djibouti' Region 'Sub-Saharan Africa' with
item type 'Cosmetics'
# made the maximum Total Profit of '1254472.05' while the maximum
highest Total Revenue of '5513227.50' was for
#Country 'Mexico' Region 'North America' with item type 'Household' .
```

```
df_2015 = inp1[inp1['Order Year']==2015]

df_grouped = df_2015.groupby(['Region','Country','Sales
Channel','Order Priority','Order Year','Order Quarter','Order
Month','Units Sold','Item Type'])['Total Revenue','Total
Profit'].sum().reset_index()

df_sorted = df_grouped.sort_values(by='Total Profit', ascending=False)

print(df_sorted)
```

```
                          Region                Country Sales Channel
\
0                           Asia                Myanmar       Offline

9             Sub-Saharan Africa             Madagascar       Offline

4                         Europe                Austria       Offline

1                           Asia                Myanmar        Online

2          Australia and Oceania              Australia        Online

3          Australia and Oceania        Solomon Islands        Online

10            Sub-Saharan Africa  Republic of the Congo       Offline

7                  North America                 Mexico       Offline

5                         Europe               Portugal        Online

8             Sub-Saharan Africa               Cameroon       Offline

6   Middle East and North Africa                  Libya        Online


   Order Priority  Order Year  Order Quarter  Order Month  Units Sold
\
0               H        2015              1            1        8250

9               L        2015              2            4        7342

4               H        2015              1            2        2847

1               H        2015              4           11        5930

2               C        2015              4           10        2924

3               C        2015              1            2        2974

10              M        2015              3            7        6070
```

```
7               M        2015               3              7         5767

5               H        2015               3              7         1273

8               C        2015               2              4         5430

6               L        2015               3              8          673
```

```
          Item Type  Total Revenue  Total Profit
0         Household     5513227.50    1367272.50
9           Clothes      802333.76     539196.48
4         Cosmetics     1244708.40     495007.89
1           Clothes      648030.40     435499.20
2   Office Supplies     1904138.04     369155.00
3         Baby Food      759202.72     285087.64
10    Personal Care      496101.10     152114.20
7     Personal Care      471336.91     144521.02
5         Baby Food      324971.44     122029.78
8         Beverages      257653.50      85033.80
6            Fruits        6279.09       1621.93
```

```
# In year '2015' ,Country 'Myanmar' Region 'Asia' with item type
'Household'
# made the maximum Total Profit of '1367272.50' & Total Revenue of
'5513227.50'.

df_2016 = inp1[inp1['Order Year']==2016]

df_grouped = df_2016.groupby(['Region','Country','Sales
Channel','Order Priority','Order Year','Order Quarter','Order
Month','Units Sold','Item Type'])['Total Revenue','Total
Profit'].sum().reset_index()

df_sorted = df_grouped.sort_values(by='Total Profit', ascending=False)

print(df_sorted)
```

```
                            Region       Country Sales Channel  \
3                           Europe       Iceland        Online
0                             Asia     Sri Lanka       Offline
6      Middle East and North Africa          Iran        Online
1  Central America and the Caribbean        Belize       Offline
4                           Europe      Moldova         Online
2  Central America and the Caribbean      Honduras        Online
9                Sub-Saharan Africa  Sierra Leone       Offline
8                Sub-Saharan Africa  Sierra Leone       Offline
7                Sub-Saharan Africa       Comoros       Offline
5                           Europe      Slovenia       Offline

  Order Priority  Order Year  Order Quarter  Order Month  Units
```

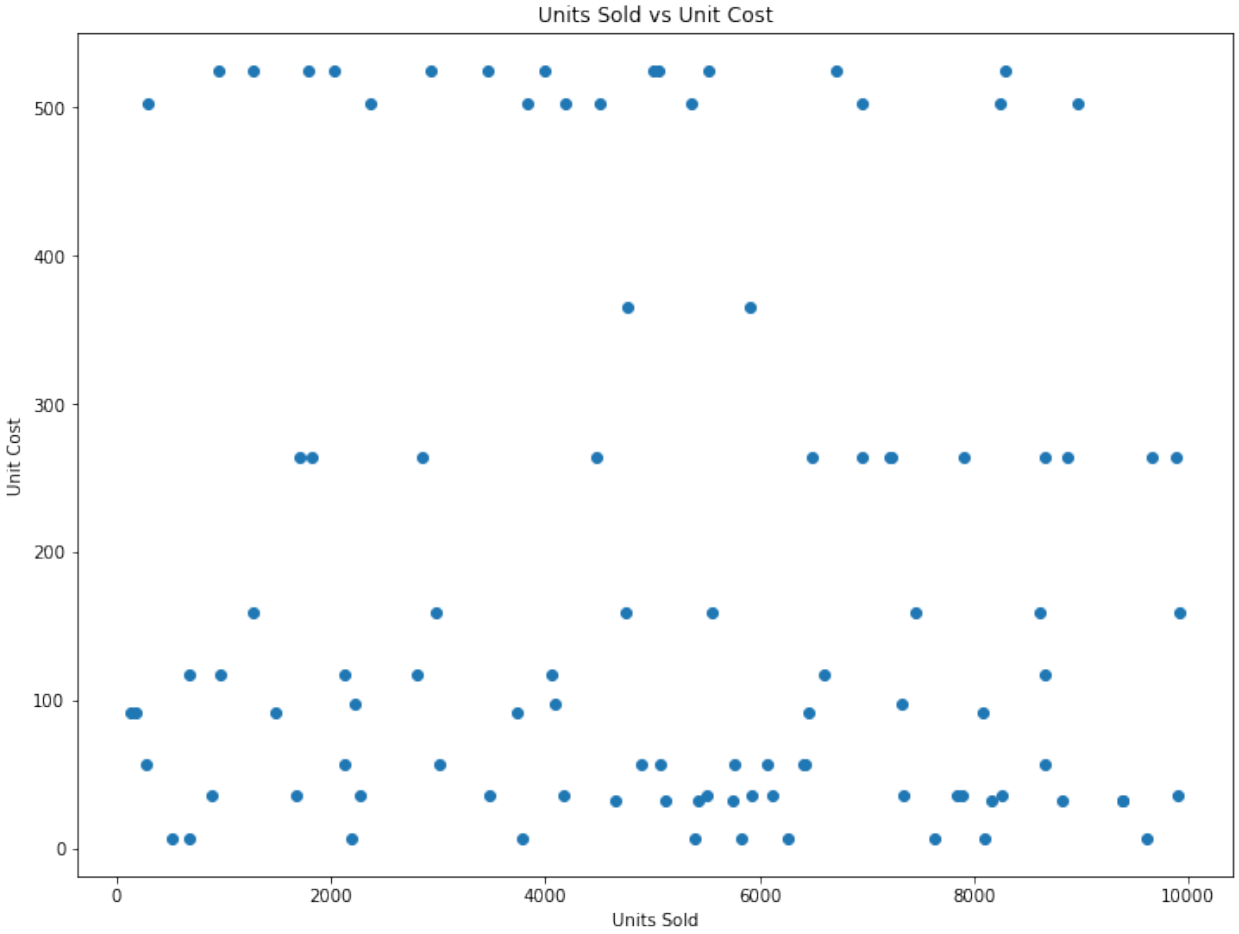
```
Sold  \
3              C        2016               4            12         8867

0              M        2016               4            11         6952

6              H        2016               4            11         6489

1              M        2016               3             7         5498

4              L        2016               2             5         5070

2              L        2016               2             6         2225

9              H        2016               4            12          948

8              C        2016               2             6         1485

7              H        2016               1             3          962

5              C        2016               4            10         4660


         Item Type  Total Revenue  Total Profit
3        Cosmetics     3876652.40    1541705.29
0        Cosmetics     3039414.40    1208744.24
6        Cosmetics     2836990.80    1128242.43
1          Clothes      600821.44     403773.12
4    Personal Care      414371.10     127054.20
2           Snacks      339490.50     122686.50
9  Office Supplies      617347.08     119685.00
8       Vegetables      228779.10      93748.05
7           Cereal      197883.40      85223.58
5        Beverages      221117.00      72975.60
```

```
# In year '2016' ,Country 'Iceland' Region 'Europe' with item type
'Cosmetics'
# made the maximum Total Profit of '1541705.29' & Total Revenue of
'3876652.40'.

df_2017 = inp1[inp1['Order Year']==2017]

df_grouped = df_2017.groupby(['Region','Country','Sales
Channel','Order Priority','Order Year','Order Quarter','Order
Month','Units Sold','Item Type'])['Total Revenue','Total
Profit'].sum().reset_index()

df_sorted = df_grouped.sort_values(by='Total Profit', ascending=False)

print(df_sorted)
```

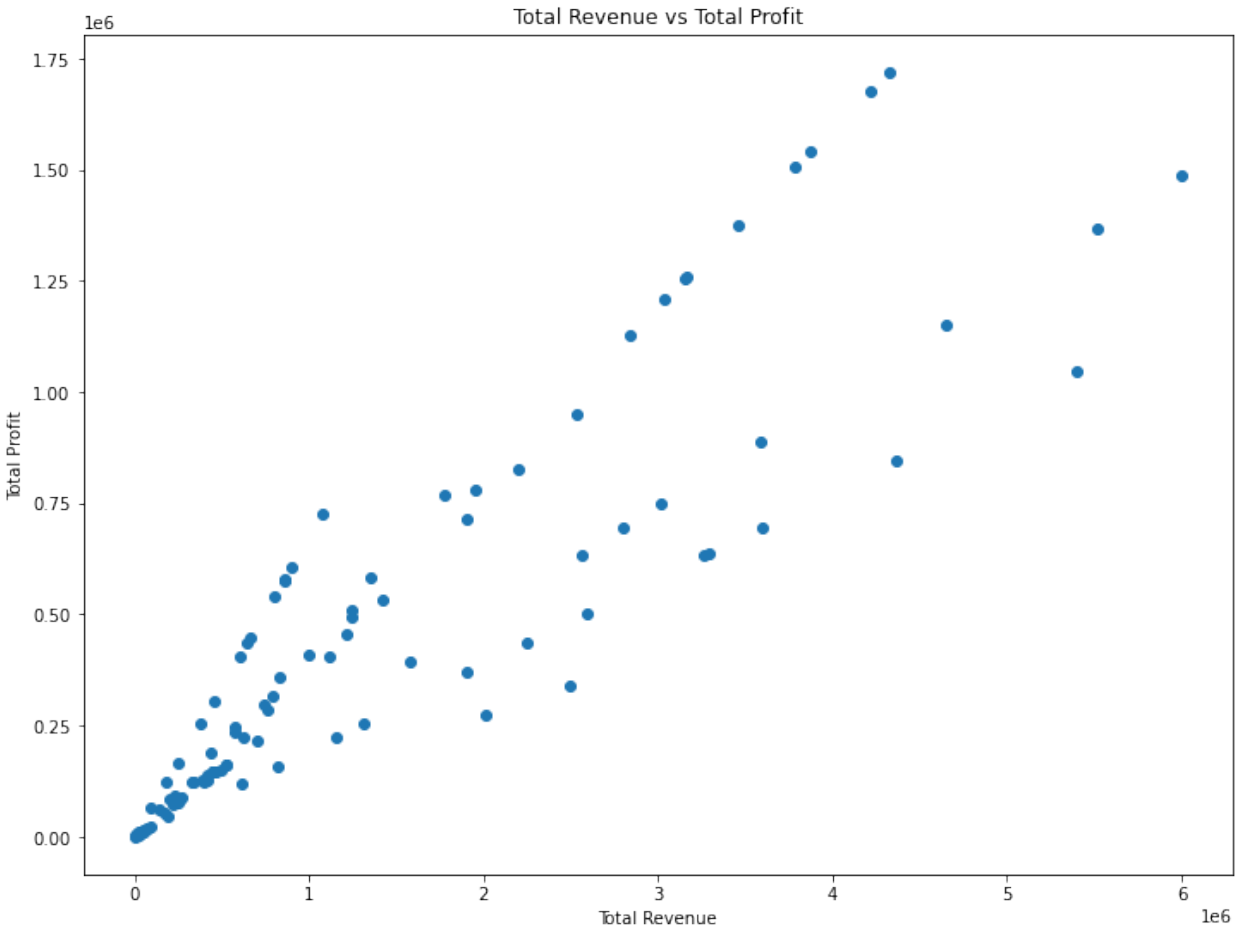
```
                            Region     Country Sales Channel Order
Priority  \
```

```
2  Central America and the Caribbean    Honduras       Offline
H
4                 Sub-Saharan Africa    Djibouti        Online
H
0                               Asia  Bangladesh        Online
L
5                 Sub-Saharan Africa    Djibouti        Online
M
3                             Europe      France        Online
H
7                 Sub-Saharan Africa  The Gambia        Online
M
1  Central America and the Caribbean  Costa Rica       Offline
L
6                 Sub-Saharan Africa       Niger        Online
H

   Order Year  Order Quarter  Order Month  Units Sold      Item
Type  \
2        2017              1            2        8974      Household

4        2017              2            5        8656         Cereal

0        2017              1            1        8263        Clothes

5        2017              1            2        7327         Snacks

3        2017              2            5        1815      Cosmetics

7        2017              1            1        4767           Meat

1        2017              2            5        6409  Personal Care

6        2017              1            3        3015  Personal Care


   Total Revenue  Total Profit
2     5997054.98    1487261.02
4     1780539.20     766835.04
0      902980.64     606834.72
5     1117953.66     404010.78
3      793518.00     315574.05
7     2011149.63     272672.40
1      523807.57     160609.54
6      246415.95      75555.90

# In year '2017' ,Country 'Honduras' Region 'Central America and the
Caribbean' with item type 'Household'
# made the maximum Total Profit of '1487261.02' & 'Total Revenue' of
'5997054.98'.
```

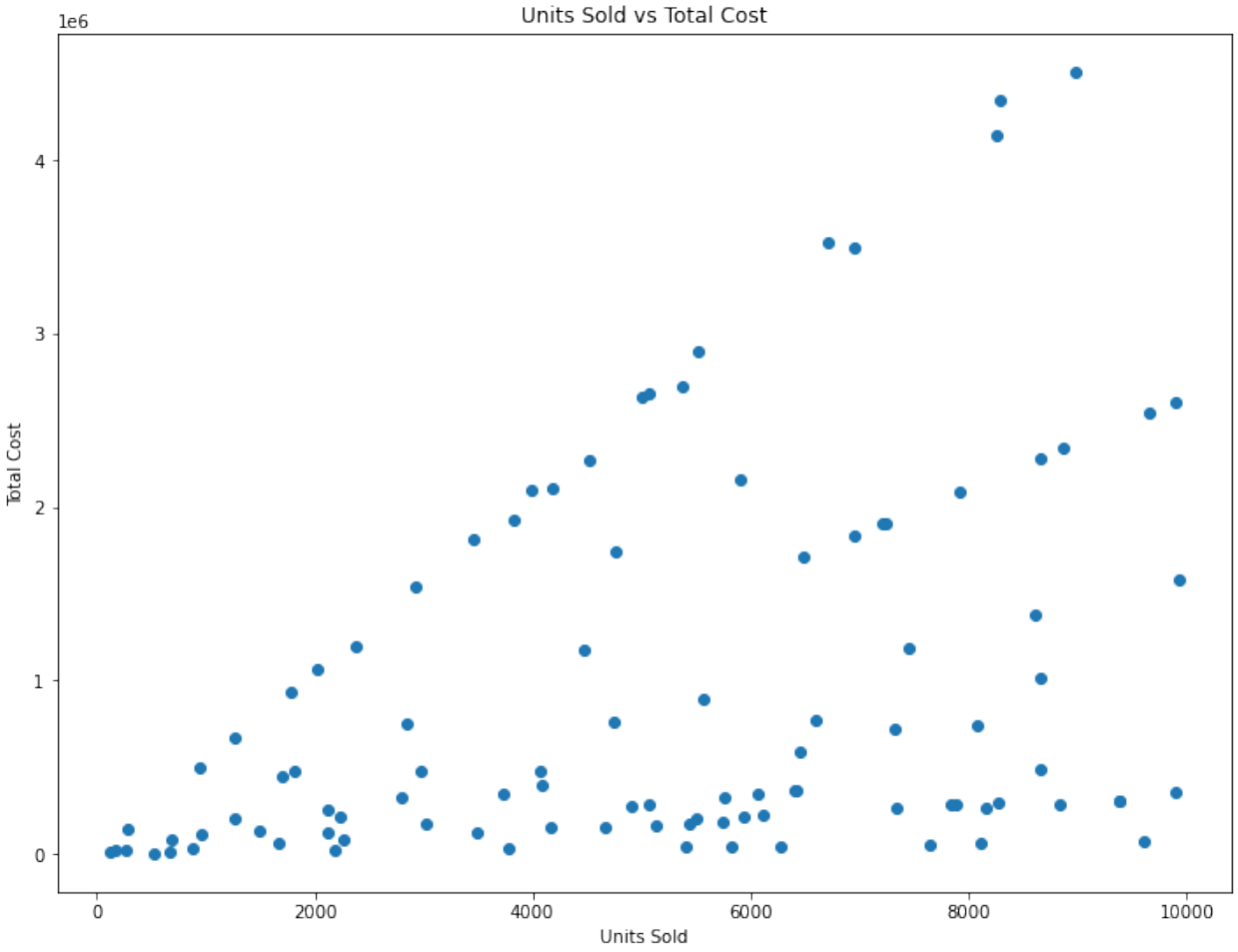
```
# Scatter plot
fig= plt.subplots(figsize=(12, 9))
plt.scatter(inp1['Units Sold'], inp1['Unit Cost'])
plt.title('Units Sold vs Unit Cost')
plt.xlabel('Units Sold')
plt.ylabel('Unit Cost')
plt.show()
```




```
# No coorelation is observed between Units Sold & Unit Cost.

# Scatter plot
fig= plt.subplots(figsize=(12, 9))
plt.scatter(inp1['Total Revenue'], inp1['Total Profit'])
plt.title('Total Revenue vs Total Profit')
plt.xlabel('Total Revenue')
plt.ylabel('Total Profit')
plt.show()
```




```
# Linear coorelation is observed between Total Revenue & Total Profit.

# Scatter plot
fig= plt.subplots(figsize=(12, 9))
plt.scatter(inp1['Units Sold'], inp1['Total Cost'])
plt.title('Units Sold vs Total Cost')
plt.xlabel('Units Sold')
plt.ylabel('Total Cost')
plt.show()
```




```
# Linear coorelation is observed between Units Sold & Total Cost.

df_grouped = inp1.groupby(['Region','Country','Sales Channel','Order
Priority','Order Year','Order Quarter','Order Month','Units
Sold','Item Type'])['Total Revenue','Total
Profit'].sum().reset_index()

df_sorted = df_grouped.sort_values(by='Total Profit', ascending=False)

print(df_sorted.head(10))
```

```
                              Region      Country Sales Channel  \
58       Middle East and North Africa     Pakistan       Offline
19              Australia and Oceania        Samoa        Online
34                             Europe      Iceland        Online
48                             Europe  Switzerland       Offline
26  Central America and the Caribbean     Honduras       Offline
42                             Europe      Romania        Online
6                                Asia      Myanmar       Offline
51       Middle East and North Africa   Azerbaijan        Online
72                  Sub-Saharan Africa     Djibouti       Offline
```

```
8                                Asia    Sri Lanka       Offline

   Order Priority  Order Year  Order Quarter  Order Month  Units Sold
\
58              L        2013              3            7        9892

19              H        2013              3            7        9654

34              C        2016              4           12        8867

48              M        2012              3            9        8661

26              H        2017              1            2        8974

42              H        2010              4           11        7910

6               H        2015              1            1        8250

51              M        2010              1            2        7234

72              H        2014              2            4        7215

8               M        2016              4           11        6952


    Item Type  Total Revenue  Total Profit
58  Cosmetics     4324782.40    1719922.04
19  Cosmetics     4220728.80    1678540.98
34  Cosmetics     3876652.40    1541705.29
48  Cosmetics     3786589.20    1505888.07
26  Household     5997054.98    1487261.02
42  Cosmetics     3458252.00    1375311.70
6   Household     5513227.50    1367272.50
51  Cosmetics     3162704.80    1257775.58
72  Cosmetics     3154398.00    1254472.05
8   Cosmetics     3039414.40    1208744.24
```

```
df_grouped = inp1.groupby(['Region','Country','Sales Channel','Order
Priority','Order Year','Order Quarter','Order Month','Units
Sold','Item Type'])['Total Revenue','Total
Profit'].sum().reset_index()

df_sorted = df_grouped.sort_values(by='Total Revenue',
ascending=False)

print(df_sorted.head(10))
```

```
                               Region      Country Sales Channel  \
26  Central America and the Caribbean     Honduras       Offline
6                                Asia      Myanmar       Offline
```

```
35                            Europe    Lithuania       Offline
61                     North America       Mexico       Offline
1                               Asia       Brunei        Online
58       Middle East and North Africa     Pakistan       Offline
19              Australia and Oceania        Samoa        Online
34                            Europe      Iceland        Online
48                            Europe  Switzerland       Offline
67                Sub-Saharan Africa     Cameroon        Online

   Order Priority  Order Year  Order Quarter  Order Month  Units Sold
\
26              H        2017              1            2        8974

6               H        2015              1            1        8250

35              H        2010              4           10        8287

61              C        2014              4           11        6954

1               L        2012              2            4        6708

58              L        2013              3            7        9892

19              H        2013              3            7        9654

34              C        2016              4           12        8867

48              M        2012              3            9        8661

67              M        2011              4           11        5518


          Item Type  Total Revenue  Total Profit
26        Household     5997054.98    1487261.02
6         Household     5513227.50    1367272.50
35  Office Supplies     5396577.27    1046233.75
61        Household     4647149.58    1152486.42
1   Office Supplies     4368316.68     846885.00
58        Cosmetics     4324782.40    1719922.04
19        Cosmetics     4220728.80    1678540.98
34        Cosmetics     3876652.40    1541705.29
48        Cosmetics     3786589.20    1505888.07
67  Office Supplies     3593376.78     696647.50
```

```
df_grouped = inp1.groupby(['Region','Country','Sales Channel','Order
Priority','Order Year','Order Quarter','Order Month','Units
Sold','Item Type'])['Total Revenue','Total Profit','Total
Cost'].sum().reset_index()

df_sorted = df_grouped.sort_values(by='Total Cost', ascending=False)
```

```
print(df_sorted.head(10))
```

```
                                Region       Country Sales Channel  \
26  Central America and the Caribbean      Honduras       Offline
35                              Europe     Lithuania       Offline
6                                 Asia       Myanmar       Offline
1                                 Asia        Brunei        Online
61                      North America        Mexico       Offline
67                  Sub-Saharan Africa      Cameroon        Online
82                  Sub-Saharan Africa    Mozambique       Offline
86                  Sub-Saharan Africa        Rwanda       Offline
10                                Asia  Turkmenistan        Online
58       Middle East and North Africa      Pakistan       Offline

   Order Priority  Order Year  Order Quarter  Order Month  Units Sold
\
26              H        2017              1            2        8974

35              H        2010              4           10        8287

6               H        2015              1            1        8250

1               L        2012              2            4        6708

61              C        2014              4           11        6954

67              M        2011              4           11        5518

82              L        2012              1            2        5367

86              L        2013              1            2        5062

10              M        2013              2            4        5010

58              L        2013              3            7        9892


          Item Type  Total Revenue  Total Profit  Total Cost
26        Household     5997054.98    1487261.02  4509793.96
35  Office Supplies     5396577.27    1046233.75  4350343.52
6         Household     5513227.50    1367272.50  4145955.00
1   Office Supplies     4368316.68     846885.00  3521431.68
61        Household     4647149.58    1152486.42  3494663.16
67  Office Supplies     3593376.78     696647.50  2896729.28
82        Household     3586605.09     889472.91  2697132.18
86  Office Supplies     3296425.02     639077.50  2657347.52
10  Office Supplies     3262562.10     632512.50  2630049.60
58        Cosmetics     4324782.40    1719922.04  2604860.36
```

```
# Cleaned dataset converted to excel for Power BI analysis
inp1.to_excel('inp1.xlsx')
```