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```
import numpy as np
import pandas as pd
```

```
all_data = pd.read_csv("/content/drive/MyDrive/Colab Notebooks/1686715083343_all_data.csv")
all_data.head()
```

	Order ID	Product	guant1ty Ordered	Pr1ce Each	Order Date	Purchase Address
0	176559.0	Bose SoundSpod Headphones	1.0	99 99	04-07-2019 22:30	682 Chestnut St, Boston, MA 02215
1	176560.0	Google Phone	1.0	600.00	04-12-2019 14:38	669 Spruce St, Los Angeles, CA 90001
2	176560.0	Wired Headphones	1.0	11.99	04-12-2019 14:38	669 Spruce St, Los Angeles, CA 90001

- Clean up the data

```
all_data.shape
```

```
(69, 6)
```

```
nan_df = all_data[all_data.isna().any(axis = 1)]
display(nan_df.head)
```

```
all_data.shape
```

```
all_data = all_data.dropna(how = 'all')
all_data.head()
```

```
<bound method NDFrame.head of     Order ID Product  Quantity Ordered  Price Each Order Date Purchase
Addres s
36       NaN     NaN               NaN         NaN        NaN              NaN
51       NaN     NaN               NaN         NaN        NaN              NaN>
```

	Order ID	Product	quant1ty Ordered	Pr1ce Each	Order Date	Purchase Address
0	176559.0	Bose SoundSpod Headphones	1.0	99.99	04-07-2019 22:30	682 Chestnut St, Boston, MA 02215
1	176560.0	Google Phone	1.0	600.00	04-12-2019 14:38	669 Spruce St, Los Angeles, CA 90001
2	176560.0	Wired Headphones	1.0	11.99	04-12-2019 14:38	669 Spruce St, Los Angeles, CA 90001

```
all_data = all_data[all_data['Order Date'].str[0:2]!='Or']
print(all_data)
```

```
    Order ID                    Product  quant1ty  Ordered  Price  Each  \
0   176559.0  Bose SouudSport Headphones                1.0       99.99
1   176560.0                Google Phone                1.0      600.00
2   176560.0             Wired Headphones               1.8       11.99
3   176561.0             Wired Headphones               1.0       11.99
4   176562.0         USB-C Charging Cable               1.0       11.95

64  259329.0     Lightning Charging Cable               1.0       14.95
65  259330.0        AA Batteries (4-pack)               2.0        3.84
66  259331.0     Apple Airpods Headphones               1.0      150.00
```

```
67  259332.0    Apple Airpods Headphones              1.0      150.00
68  259333.0  Bose SoundSport Headphones              1.0       99.99

          Order Date                     Purchase Address
0   04-07-2019 22:30       682 Chestnut St, Boston, MA 02215
1   04-12-2019 14:38    669 Spnuce St, Los Angeles, CA 90001
2   04-12-2019 14:38    669 Spruce St, Los Angeles, CA 90001
3      05/30/19 9:27       333 8th St, Los Angeles, CA 90001
4     04/29/19 13:03  381 Wilson St, San Francisco, CA 94016

64  09-05-2019 19:00       480 Lincoln St, Atlanta, GA 30301
65   09/25/19 22:01    763 Washington St, Seattle, WA 98101
66     09/29/19 7:00     770 4th St, New York City, NY 10001
67    09/16/19 19:21          782 Lake St, Atlanta, GA 30301
68    09/19/19 18:03   347 Ridge St, San Francisco, CA 94016

[67 rows x 6 columns]
```

```
all_data['Quantity Ordered'] = pd.to_numeric(all_data['Quantity Ordered'] )
a11_data['Price Each'] = pd.to_numeric(a11_data['Price Each'])
```

```
all_data['Month'] = pd.to_datetime(all_data['Order Date']).dt.month
all_data.head()
```

	Order ID	Product	quant1ty Ordered	Pr1ce Each	Order Date	Purchase Address	Month
0	176559.0	Bose SoundSpod **Headphones**	1.0	99 99	04-07-2019 22:30	682 Chestnut St, Boston, MA 02215	4
1	176560.0	Google Phone	1.0	600.00	04-12-2019 14:38	669 Spruce St, Los Angeles, CA 90001	4
2	176560.0	Wired Headphones	1.0	11.99	04-12-2019 14:38	669 Spruce St, Los Angeles, CA 90001	4

```
def get_c1ty(address):
  return address.split(“,“)[1] .strip(“ “)

def get_state(address):
  return address.split(“,“)[2].strip(“ “)[1]

all_data['City'] = all_data['Purchase Address'].apply(lambda x: f“{get_city(x)} ({get_state(x)})")
all_data.head()
```

	Order ID	Product	guant1ty Ordered	Pr1ce Each	Order Date	Purchase Address	Month	City
0	176559.0	Bose SoundSport Headphones	1.0	9 g	04-07-2019 22:30	682 Chestnut St, Boston, MA 02215	4	Boston (A)
1	176560.0	Google Phone	1.0	600.00	04-12-2019 14:38	669 Spruce St, Los Angeles, CA 90001	4	Los Angeles (A)
2	176560.0	Wired Headphones	1.0	11.99	04-12-2019 14:38	669 Spruce St, Los Angeles, CA 90001	4	Los Angeles (A)

Data Exploration

- 1.What was best month for sales and how much was earned in that month?

```
all_data['Sales'] = all_data['Quantity Ordered'].astype('int')*all_data['Price Each'].astype("float”)
all_data.groupby(['Month']).sum()
```

```
‹ipython-input-12-75ccdacaf5c0›:2: FutureWarning: The default value of numeric_only in DataFrameGroupB)
  all_data.groupby(['Month']).sum()
```

Nonth	Order ID	quantity Ordered	Price Each	Sales
4	7335546.0	123.0	885.80	1210.76
5	353124.0	2.0	111.98	111.98
6	184076.0	1.0	14.95	14.95
8	726962.0	9.0	23.92	50.83
9	2378802.0	17.0	591.44	616.62
10	550924.0	11.0	10.67	39.69
12	550635.0	17.0	8.97	50.83

2. / çn çJ}y1 o|d the mq@ provat? 65.31

```
Dummycity = all_data.groupby(['City'])
print(Dummycity)
#city_max = all_data.groupby(['City']).sum()
#print(max(city_max))
```

```
‹pandas.core.groupby.generic.DataFrameGroupBy object at 0x7f98eb722f80›
```

4.What products are most often sold together?

```
df = all_data[all_data['Order ID'].dup1icated(keep=False)]

#Referenced: https://stackoverf1ow.com/questions/27298178/concatenate-strings-from-severa
df['Grouped']= df.groupby('Order ID')['Product']. transform(lambda x: ','.join(x))
df2=df[['Order ID', 'Grouped']].drop_dup1icates()
print(df ['Grouped'])
```

```
1    Google Phone,Wired Headphones
2    Google Phone,Wired Headphones
Name: Grouped, dtype: object
‹ipython-input-18-67a4bc93e82d›:4: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: _____ _____ guide/indexing.html#returning-a-view-versus-a-cc
  df['Grouped']= df.groupby('Order ID')['Product']. transform(lambda x: ','.joiu(x))
```

```
from itertools import combinations
from collections import Counter

count = Counter()

for row in df2['Grouped']:
  row_list = row.split(', ')
  count.update(Counter(combinations (now_list, 2)))

for key, value in count.most_common (10): print (key, value)
```

```
('Google Phone', 'Wired Headphones') 1
```

- 3.Which product sold the most? Why do you think it sold the most?

```
product_group = all_data.groupby('Product')
quantity_ordered = product_group.sum()['Quantity Ordered']
priut (quantity_ordered)
```

```
Product
AA Batteries (4-pack)          64.0
AAA Batteries (4-pack)        109.0
Apple Airpods Headphones        3.0
Bose SoundSport Headphones      3.0
Google Phone                    1.0
Lightning Charging Cable        4.0
```

```
USB-C Charging Cable            8.0
Wired Headphones                7.0
Name: Quantity Ordered, dtype: float64
<ipython-input-17-ddc2ef51f24b>:2: FutureWarning: The default value of numeric_only in DataFrameGroupBy.sum is deprecated. In a future
  quantity_ordered = product_group.sum()['Quantity Ordered']
```

```
prices = all_data.groupby('Product').mean()['Price Each']
print(prices)
```

```
Product
AA Batteries (4-pack)           3.84
AAA Batteries (4-pack)          2.99
Apple Airpods Headphones      150.00
Bose SoundSport  Headphones    99.99
Google Phone                  600.00
Lightning Charging Cable       14.95
USB-C Charging Cable           11.95
Wired Headphones               11.99
Name: Price Each, dtype: float64
<ipython-input-22-ff49c555915e9>:1: FutureWarning: The default value of numeric_only in DataFrameGroupBy.mean is deprecated. In a future
  prices = all_data.groupby('Product').mean()['Price Each']
```