TASK-1 [Data preparation and customer analytics]

In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
```

Loading the Datasets

In [2]:
```
df_purchase=pd.read_csv('QVI_purchase_behaviour.csv')
df_transactions=pd.read_excel('QVI_transaction.xlsx')
```

DATA CLEANING FOR CUSTOMER PURCHASE DATASET

In [3]:
```
df_purchase.head()
```

Out[3]:

	LYLTY_CARD_NBR	LIFESTAGE	PREMIUM_CUSTOMER
0	1000	YOUNG SINGLES/COUPLES	Premium
1	1002	YOUNG SINGLES/COUPLES	Mainstream
2	1003	YOUNG FAMILIES	Budget
3	1004	OLDER SINGLES/COUPLES	Mainstream
4	1005	MIDAGE SINGLES/COUPLES	Mainstream

In [4]:
```
df_purchase.shape
```

Out[4]:
```
(72637, 3)
```

Check Data Types

In [5]:
```
pd.DataFrame({"Data type":df_purchase.dtypes})
```

Out[5]:

	Data type
LYLTY_CARD_NBR	int64
LIFESTAGE	object
PREMIUM_CUSTOMER	object

Check missing values

In [6]:
```
df_purchase.isnull().sum()
```

Out[6]:
```
LYLTY_CARD_NBR      0
LIFESTAGE           0
PREMIUM_CUSTOMER    0
dtype: int64
```

Check Data Consistency

In [7]:
```
df_purchase['LIFESTAGE'].value_counts()
```

Out[7]:
```
RETIREES                  14805
OLDER SINGLES/COUPLES     14609
YOUNG SINGLES/COUPLES     14441
OLDER FAMILIES             9780
YOUNG FAMILIES             9178
MIDAGE SINGLES/COUPLES     7275
NEW FAMILIES               2549
Name: LIFESTAGE, dtype: int64
```

In [8]:
```
df_purchase['PREMIUM_CUSTOMER'].value_counts()
```

Out[8]:
```
Mainstream    29245
Budget        24470
Premium       18922
Name: PREMIUM_CUSTOMER, dtype: int64
```

DATA CLEANING FOR TRANSACTIONS DATASET

In [9]:
```
df_transactions.head()
```

Out[9]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES
0	43390	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	6.0
1	43599	1	1307	348	66	CCs Nacho Cheese 175g	3	6.3
2	43605	1	1343	383	61	Smiths Crinkle Cut Chips Chicken 170g	2	2.9
3	43329	2	2373	974	69	Smiths Chip Thinly S/Cream&Onion 175g	5	15.0
4	43330	2	2426	1038	108	Kettle Tortilla ChpsHny&Jlpno Chili 150g	3	13.8

Check for Data Types

In [10]:
```
pd.DataFrame({"Data type":df_transactions.dtypes})
```

Out[10]:

	Data type
DATE	int64
STORE_NBR	int64
LYLTY_CARD_NBR	int64
TXN_ID	int64
PROD_NBR	int64
PROD_NAME	object
PROD_QTY	int64
TOT_SALES	float64

In [11]:
```
df_transactions.shape
```

Out[11]:
```
(264836, 8)
```

Statistical Information

In [12]:
```
df_transactions.describe()
```

Out[12]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_QTY	TOT_SALES
count	264836.000000	264836.00000	2.648360e+05	2.648360e+05	264836.000000	264836.000000	264836.000000
mean	43464.036260	135.08011	1.355495e+05	1.351583e+05	56.583157	1.907309	7.304200
std	105.389282	76.78418	8.057998e+04	7.813303e+04	32.826638	0.643654	3.083226
min	43282.000000	1.00000	1.000000e+03	1.000000e+00	1.000000	1.000000	1.500000
25%	43373.000000	70.00000	7.002100e+04	6.760150e+04	28.000000	2.000000	5.400000
50%	43464.000000	130.00000	1.303575e+05	1.351375e+05	56.000000	2.000000	7.400000
75%	43555.000000	203.00000	2.030942e+05	2.027012e+05	85.000000	2.000000	9.200000
max	43646.000000	272.00000	2.373711e+06	2.415841e+06	114.000000	200.000000	650.000000

Missing values check

In [13]:
```
df_transactions.isnull().sum()
```

Out[13]:
```
DATE              0
STORE_NBR         0
LYLTY_CARD_NBR    0
TXN_ID            0
PROD_NBR          0
PROD_NAME         0
PROD_QTY          0
TOT_SALES         0
dtype: int64
```

In [14]:
```
df_transactions.PROD_NAME.value_counts()
```

Out[14]:
```
Kettle Mozzarella   Basil & Pesto 175g      3304
Kettle Tortilla ChpsHny&Jlpno Chili 150g    3296
Cobs Popd Swt/Chlli &Sr/Cream Chips 110g    3269
Tyrrells Crisps     Ched & Chives 165g      3268
Cobs Popd Sea Salt  Chips 110g              3265
                                            ...
RRD Pc Sea Salt     165g                    1431
Woolworths Medium   Salsa 300g              1430
NCC Sour Cream &    Garden Chives 175g      1419
French Fries Potato Chips 175g              1418
WW Crinkle Cut      Original 175g           1410
Name: PROD_NAME, Length: 114, dtype: int64
```

EXtract pack size from PROD_NAME Column

In [15]:
```
df_separated = (df_transactions['PROD_NAME'].str.extract(r'(?P<PROD_COMPANY>.*?)(?P<PACK_SIZE_GRAMS>\d+(?:\.\d+)?)')
                .applymap(str.strip))
df_separated.head()
```

Out[15]:

	PROD_COMPANY	PACK_SIZE_GRAMS
0	Natural Chip Compny SeaSalt	175
1	CCs Nacho Cheese	175
2	Smiths Crinkle Cut Chips Chicken	170
3	Smiths Chip Thinly S/Cream&Onion	175
4	Kettle Tortilla ChpsHny&Jlpno Chili	150

In [16]:
```
## Now Join the Separated and Transactions Tables
df_transactions.reset_index(level=None, drop=False, inplace=False, col_level=0, col_fill='')
df_transactions=pd.merge(df_transactions, df_separated, left_index=True, right_index=True)
df_transactions.head()
```

Out[16]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES	PROD_COMPANY	PACK_SIZE_GRAMS
0	43390	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	6.0	Natural Chip Compny SeaSalt	175
1	43599	1	1307	348	66	CCs Nacho Cheese 175g	3	6.3	CCs Nacho Cheese	175
2	43605	1	1343	383	61	Smiths Crinkle Cut Chips Chicken 170g	2	2.9	Smiths Crinkle Cut Chips Chicken	170
3	43329	2	2373	974	69	Smiths Chip Thinly S/Cream&Onion 175g	5	15.0	Smiths Chip Thinly S/Cream&Onion	175
4	43330	2	2426	1038	108	Kettle Tortilla ChpsHny&Jlpno Chili 150g	3	13.8	Kettle Tortilla ChpsHny&Jlpno Chili	150

In [17]:
```
#drop the PROD_NAME
df_transactions.drop(columns='PROD_NAME', inplace=True)
```

In [18]:
```
df_transactions.head()
```

Out[18]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_QTY	TOT_SALES	PROD_COMPANY	PACK_SIZE_GRAMS
0	43390	1	1000	1	5	2	6.0	Natural Chip Compny SeaSalt	175
1	43599	1	1307	348	66	3	6.3	CCs Nacho Cheese	175
2	43605	1	1343	383	61	2	2.9	Smiths Crinkle Cut Chips Chicken	170
3	43329	2	2373	974	69	5	15.0	Smiths Chip Thinly S/Cream&Onion	175
4	43330	2	2426	1038	108	3	13.8	Kettle Tortilla ChpsHny&Jlpno Chili	150

In [19]:
```
## Rearrange The columns
new_order =[0,1,2,3,4,-2,-1,5,6]
df_transactions = df_transactions[df_transactions.columns[new_order]]
```

In [20]:
```
df_transactions.head()
```

Out[20]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_COMPANY	PACK_SIZE_GRAMS	PROD_QTY	TOT_SALES
0	43390	1	1000	1	5	Natural Chip Compny SeaSalt	175	2	6.0
1	43599	1	1307	348	66	CCs Nacho Cheese	175	3	6.3
2	43605	1	1343	383	61	Smiths Crinkle Cut Chips Chicken	170	2	2.9
3	43329	2	2373	974	69	Smiths Chip Thinly S/Cream&Onion	175	5	15.0
4	43330	2	2426	1038	108	Kettle Tortilla ChpsHny&Jlpno Chili	150	3	13.8

Get the company name and Brand Name

In [21]:
```
#split on the first spacing
df_transactions[['COMPANY_NAME', 'BRAND']] = df_transactions['PROD_COMPANY'].str.split(' ', 1, expand=True)

df_transactions.head()
```

Out[21]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_COMPANY	PACK_SIZE_GRAMS	PROD_QTY	TOT_SALES	COMPANY_NAME	BRAND
0	43390	1	1000	1	5	Natural Chip Compny SeaSalt	175	2	6.0	Natural	Chip Compny SeaSalt
1	43599	1	1307	348	66	CCs Nacho Cheese	175	3	6.3	CCs	Nacho Cheese
2	43605	1	1343	383	61	Smiths Crinkle Cut Chips Chicken	170	2	2.9	Smiths	Crinkle Cut Chips Chicken
3	43329	2	2373	974	69	Smiths Chip Thinly S/Cream&Onion	175	5	15.0	Smiths	Chip Thinly S/Cream&Onion
4	43330	2	2426	1038	108	Kettle Tortilla ChpsHny&Jlpno Chili	150	3	13.8	Kettle	Tortilla ChpsHny&Jlpno Chili

In [22]:
```
df_transactions.BRAND.isnull().sum()
```

Out[22]:
```
3257
```

In [23]:
```
## Rearrange the columns
new_order =[0,1,2,3,4,-2,-1,5,6,7,8]
df_transactions = df_transactions[df_transactions.columns[new_order]]
df_transactions.head()
```

Out[23]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	COMPANY_NAME	BRAND	PROD_COMPANY	PACK_SIZE_GRAMS	PROD_QTY	TOT_SALES
0	43390	1	1000	1	5	Natural	Chip Compny SeaSalt	Natural Chip Compny SeaSalt	175	2	6.0
1	43599	1	1307	348	66	CCs	Nacho Cheese	CCs Nacho Cheese	175	3	6.3
2	43605	1	1343	383	61	Smiths	Crinkle Cut Chips Chicken	Smiths Crinkle Cut Chips Chicken	170	2	2.9
3	43329	2	2373	974	69	Smiths	Chip Thinly S/Cream&Onion	Smiths Chip Thinly S/Cream&Onion	175	5	15.0
4	43330	2	2426	1038	108	Kettle	Tortilla ChpsHny&Jlpno Chili	Kettle Tortilla ChpsHny&Jlpno Chili	150	3	13.8

In [24]:
```
## Drop the PROD_COMPANY
df_transactions.drop(columns='PROD_COMPANY', inplace=True)
df_transactions.head()
```

Out[24]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	COMPANY_NAME	BRAND	PACK_SIZE_GRAMS	PROD_QTY	TOT_SALES
0	43390	1	1000	1	5	Natural	Chip Compny SeaSalt	175	2	6.0
1	43599	1	1307	348	66	CCs	Nacho Cheese	175	3	6.3
2	43605	1	1343	383	61	Smiths	Crinkle Cut Chips Chicken	170	2	2.9
3	43329	2	2373	974	69	Smiths	Chip Thinly S/Cream&Onion	175	5	15.0
4	43330	2	2426	1038	108	Kettle	Tortilla ChpsHny&Jlpno Chili	150	3	13.8

In [25]:
```
#saving the new transactions
df_transactions.to_csv('New_transaction.csv',index=False)
```

In [ ]:

In [26]:
```
pd.DataFrame({"Data type":df_transactions.dtypes})
```

Out[26]:

	Data type
DATE	int64
STORE_NBR	int64
LYLTY_CARD_NBR	int64
TXN_ID	int64
PROD_NBR	int64
COMPANY_NAME	object
BRAND	object
PACK_SIZE_GRAMS	object
PROD_QTY	int64
TOT_SALES	float64

In [27]:
```
from datetime import datetime
df_transactions["DATE"]=pd.to_datetime(df_transactions["DATE"]) #convert to datetume

#df_transactions['DATE'] = df_transactions['DATE'].dt.strftime('%d%m%Y')
df_transactions.tail()

#Would love to see how you guys went about the Date Column
```

Out[27]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	COMPANY_NAME	BRAND	PACK_SIZE_GRAMS	PROD_QTY	TOT_SALES
264831	1970-01-01 00:00:00.000043533	272	272319	270088	89	Kettle	Sweet Chilli And Sour Cream	175	2	10.8
264832	1970-01-01 00:00:00.000043325	272	272358	270154	74	Tostitos	Splash Of Lime	175	1	4.4
264833	1970-01-01 00:00:00.000043410	272	272379	270187	51	Doritos	Mexicana	170	2	8.8
264834	1970-01-01 00:00:00.000043461	272	272379	270188	42	Doritos	Corn Chip Mexican Jalapeno	150	2	7.8
264835	1970-01-01 00:00:00.000043365	272	272380	270189	74	Tostitos	Splash Of Lime	175	2	8.8

In [28]:
```
#Connvert to numeric data type
df_transactions["PACK_SIZE_GRAMS"]=pd.to_numeric(df_transactions["PACK_SIZE_GRAMS"]) #convert to numeric
```

In [29]:
```
df_transactions.isnull().sum()
```

Out[29]:
```
DATE                  0
STORE_NBR             0
LYLTY_CARD_NBR        0
TXN_ID                0
PROD_NBR              0
COMPANY_NAME          0
BRAND              3257
PACK_SIZE_GRAMS       0
PROD_QTY              0
TOT_SALES             0
dtype: int64
```

In [30]:
```
df_transactions.PROD_NBR.value_counts()
```

Out[30]:
```
102    3304
108    3296
33     3269
112    3268
75     3265
       ...
11     1431
76     1430
98     1419
29     1418
72     1410
Name: PROD_NBR, Length: 114, dtype: int64
```

MERGE PURCHASE AND TRANSACTIONS

In [31]:
```
purchase_transaction_all=df_purchase.merge(df_transactions, how='left', on='LYLTY_CARD_NBR')
purchase_transaction_all.head()
```

Out[31]:

	LYLTY_CARD_NBR	LIFESTAGE	PREMIUM_CUSTOMER	DATE	STORE_NBR	TXN_ID	PROD_NBR	COMPANY_NAME	BRAND	PACK_SIZE_GRAMS	PROD_QTY	TOT_SALES
0	1000	YOUNG SINGLES/COUPLES	Premium	1970-01-01 00:00:00.000043390	1	1	5	Natural	Chip Compny SeaSalt	175	2	6.
1	1002	YOUNG SINGLES/COUPLES	Mainstream	1970-01-01 00:00:00.000043359	1	2	58	Red	Rock Deli Chikn&Garlic Aioli	150	1	2.
2	1003	YOUNG FAMILIES	Budget	1970-01-01 00:00:00.000043531	1	3	52	Grain	Waves Sour Cream&Chives	210	1	3.
3	1003	YOUNG FAMILIES	Budget	1970-01-01 00:00:00.000043532	1	4	106	Natural	ChipCo Hony Soy Chckn	175	1	3.
4	1004	OLDER SINGLES/COUPLES	Mainstream	1970-01-01 00:00:00.000043406	1	5	96	WW	Original Stacked Chips	160	1	1.

In [32]:
```
purchase_transaction_all.shape
```

Out[32]:
```
(264836, 12)
```

In [33]:
```
purchase_transaction_all.describe()
```

Out[33]:

	LYLTY_CARD_NBR	STORE_NBR	TXN_ID	PROD_NBR	PACK_SIZE_GRAMS	PROD_QTY	TOT_SALES
count	2.648360e+05	264836.00000	2.648360e+05	264836.000000	264836.000000	264836.000000	264836.000000
mean	1.355495e+05	135.08011	1.351583e+05	56.583157	182.427004	1.907309	7.304200
std	8.057998e+04	76.78418	7.813303e+04	32.826638	64.327196	0.643654	3.083226
min	1.000000e+03	1.00000	1.000000e+00	1.000000	70.000000	1.000000	1.500000
25%	7.002100e+04	70.00000	6.760150e+04	28.000000	150.000000	2.000000	5.400000
50%	1.303575e+05	130.00000	1.351375e+05	56.000000	170.000000	2.000000	7.400000
75%	2.030942e+05	203.00000	2.027012e+05	85.000000	175.000000	2.000000	9.200000
max	2.373711e+06	272.00000	2.415841e+06	114.000000	380.000000	200.000000	650.000000

In [34]:
```
purchase_transaction_all.isnull().sum()
```

Out[34]:
```
LYLTY_CARD_NBR         0
LIFESTAGE              0
PREMIUM_CUSTOMER       0
DATE                   0
STORE_NBR              0
TXN_ID                 0
PROD_NBR               0
COMPANY_NAME           0
BRAND               3257
PACK_SIZE_GRAMS        0
PROD_QTY               0
TOT_SALES              0
dtype: int64
```

In [35]:
```
purchase_transaction_all.LYLTY_CARD_NBR.nunique()

## The number of unique customers
```

Out[35]:
```
72637
```

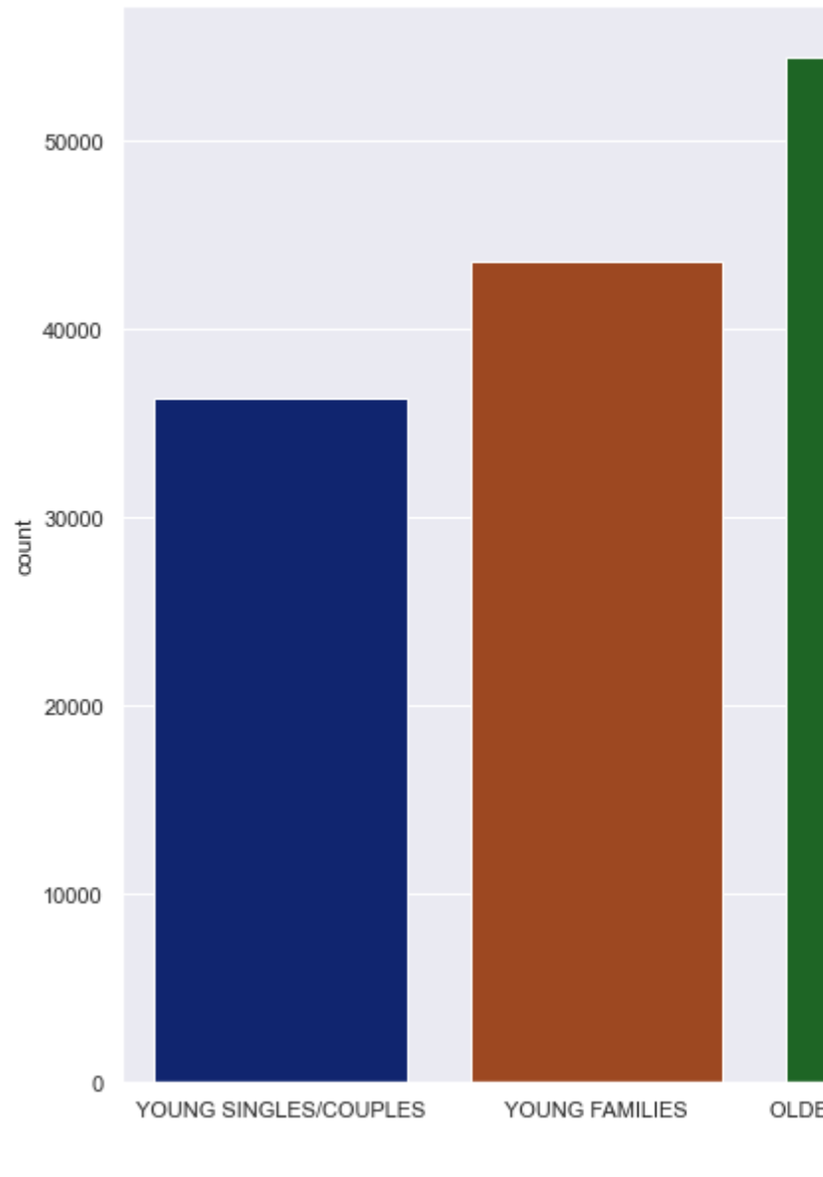
DATA EXPLORATION

In [36]:
```
sns.set(style="darkgrid")
```

Distribution In Premium Customer Segments

In [37]:
```
plt.figure(figsize=(6,6))
sns.countplot(x='PREMIUM_CUSTOMER',data=purchase_transaction_all)
plt.title('Premium Customer Segments')
```

Out[37]:
```
Text(0.5, 1.0, 'Premium Customer Segments')
```



Distribution Customer Life Stages

In [38]:
```
plt.figure(figsize=(20,10))
sns.countplot(x="LIFESTAGE", data=purchase_transaction_all,palette="dark")
plt.title("Customer Lifestages")
```

Out[38]:
```
Text(0.5, 1.0, 'Customer Lifestages')
```

DIstribution In Number of Times Similar Customer Purchased During the Period

In [39]:
```
Multi_Purchases=purchase_transaction_all.LYLTY_CARD_NBR.value_counts()
Multi_Purchases
```

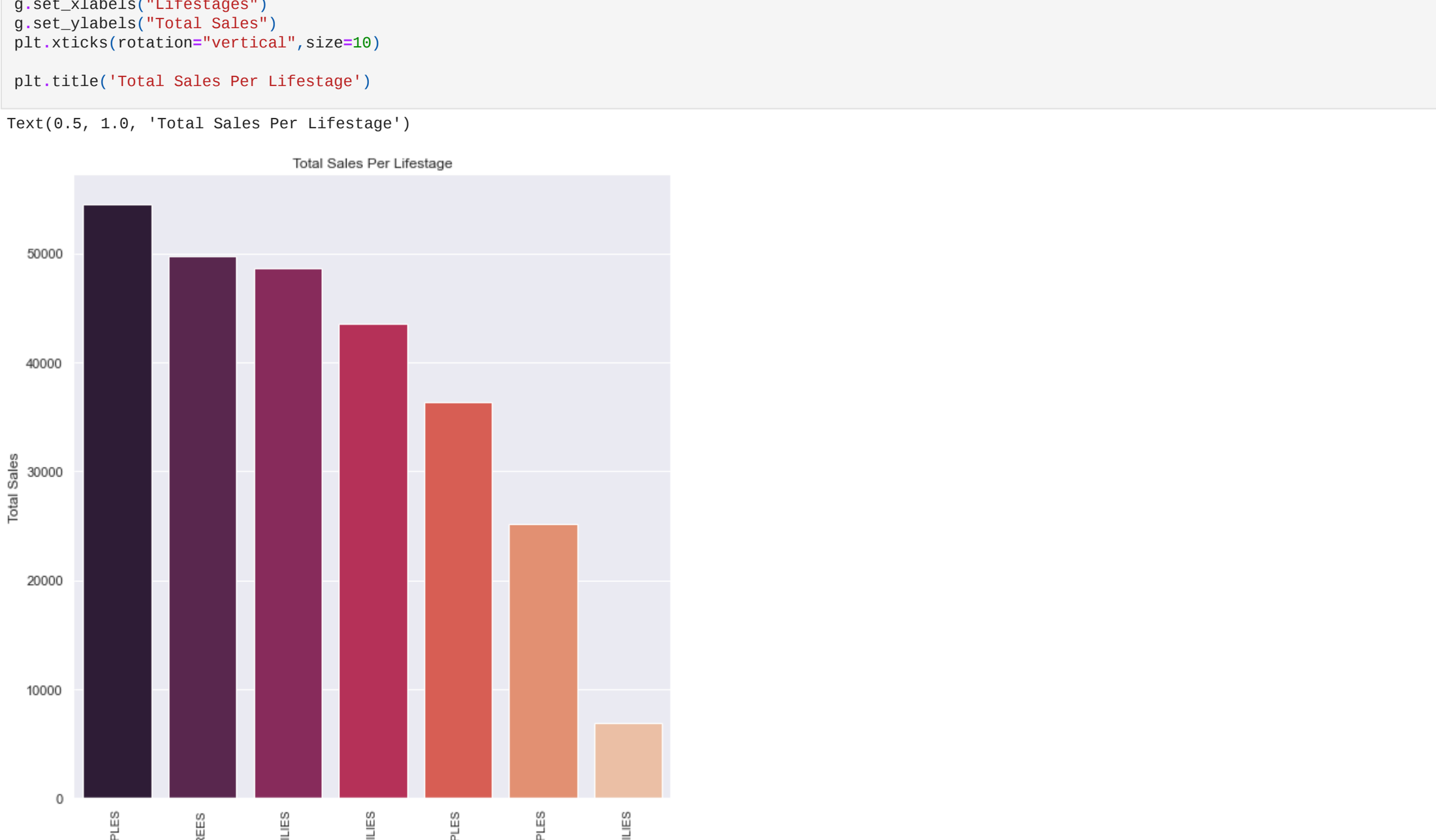
Out[39]:
```
162039     18
172032     18
13138      17
116181     17
128178     17
           ..
143033      1
143029      1
143027      1
143026      1
2373711     1
Name: LYLTY_CARD_NBR, Length: 72637, dtype: int64
```

In [40]:
```
plt.figure(figsize=(20,10))
sns.countplot(Multi_Purchases,palette="Set2")
plt.title('Number of Purchases By Single LYLTY_CARD_NBR ')


# This shows most customers Purchased Once during the period
# Highest number of times a single customer purchased during the period was 18 times
```

```
C:\Users\User\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the on
ly valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[40]:
```
Text(0.5, 1.0, 'Number of Purchases By Single LYLTY_CARD_NBR ')
```

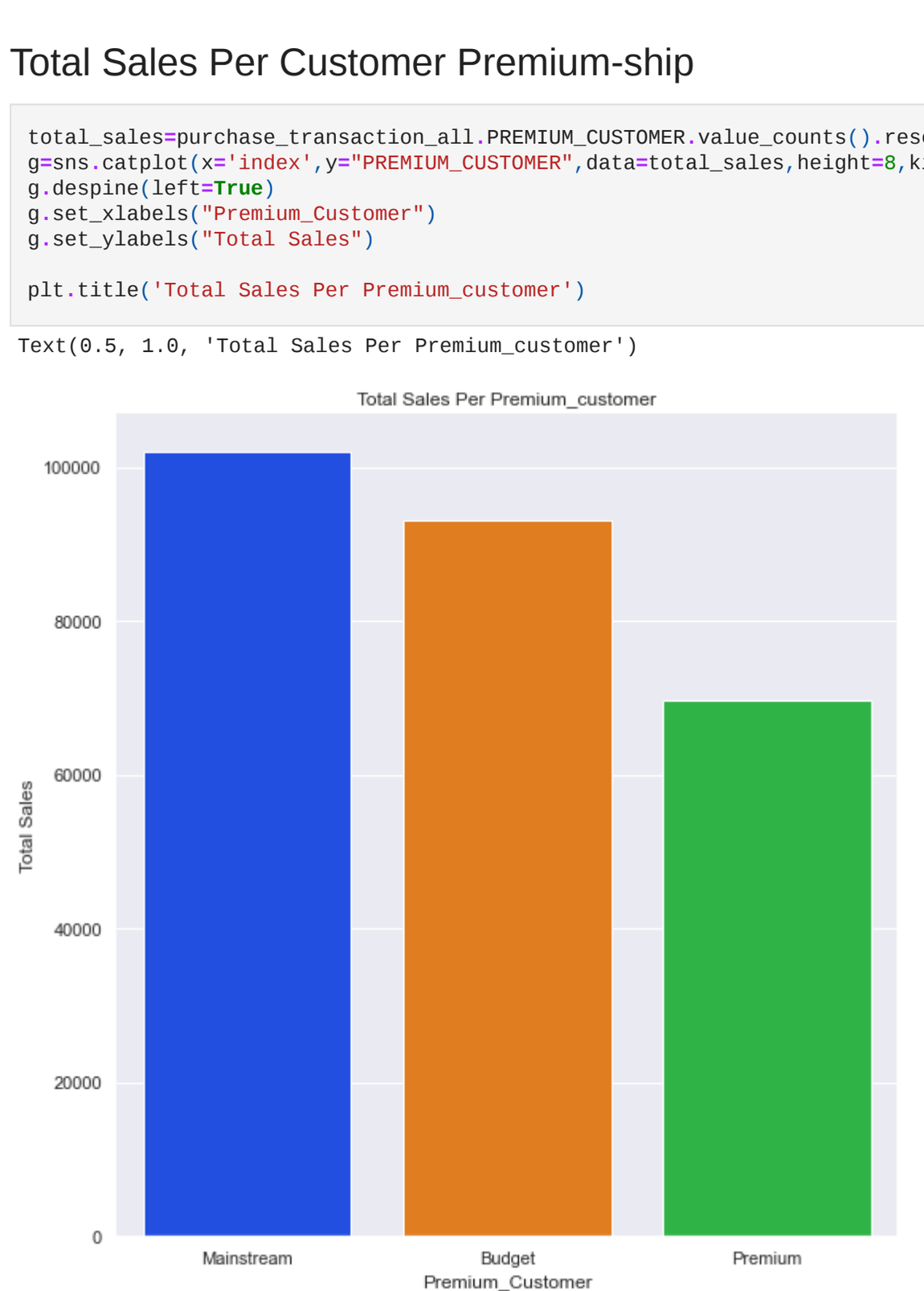


Total Sales Per LIfestage

In [41]:
```
total_sales=purchase_transaction_all.LIFESTAGE.value_counts().reset_index(name="TOT_SALES")
g=sns.catplot(x='index',y="TOT_SALES",data=total_sales,height=8,kind='bar',palette='rocket')
g.despine(left=True)
g.set_xlabels("Lifestages")
g.set_ylabels("Total Sales")
plt.xticks(rotation="vertical",size=10)

plt.title('Total Sales Per Lifestage')
```

Out[41]:
```
Text(0.5, 1.0, 'Total Sales Per Lifestage')
```

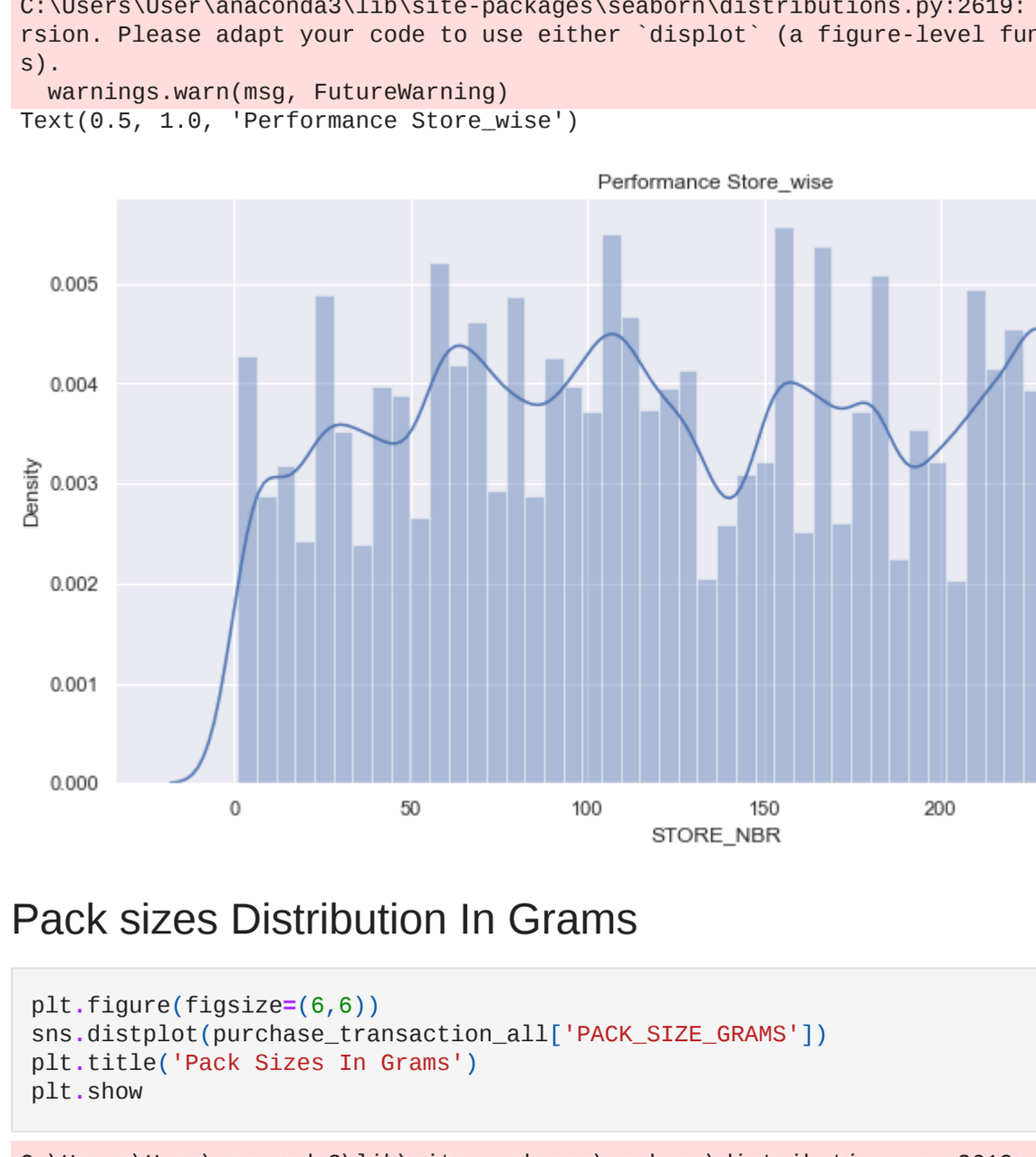


Total Sales Per Customer Premium-ship

In [42]:
```
total_sales=purchase_transaction_all.PREMIUM_CUSTOMER.value_counts().reset_index(name="PREMIUM_CUSTOMER")
g=sns.catplot(x='index',y="PREMIUM_CUSTOMER",data=total_sales,height=8,kind='bar',palette='bright')
g.despine(left=True)
g.set_xlabels("Premium_Customer")
g.set_ylabels("Total Sales")

plt.title('Total Sales Per Premium_customer')
```

Out[42]:
```
Text(0.5, 1.0, 'Total Sales Per Premium_customer')
```

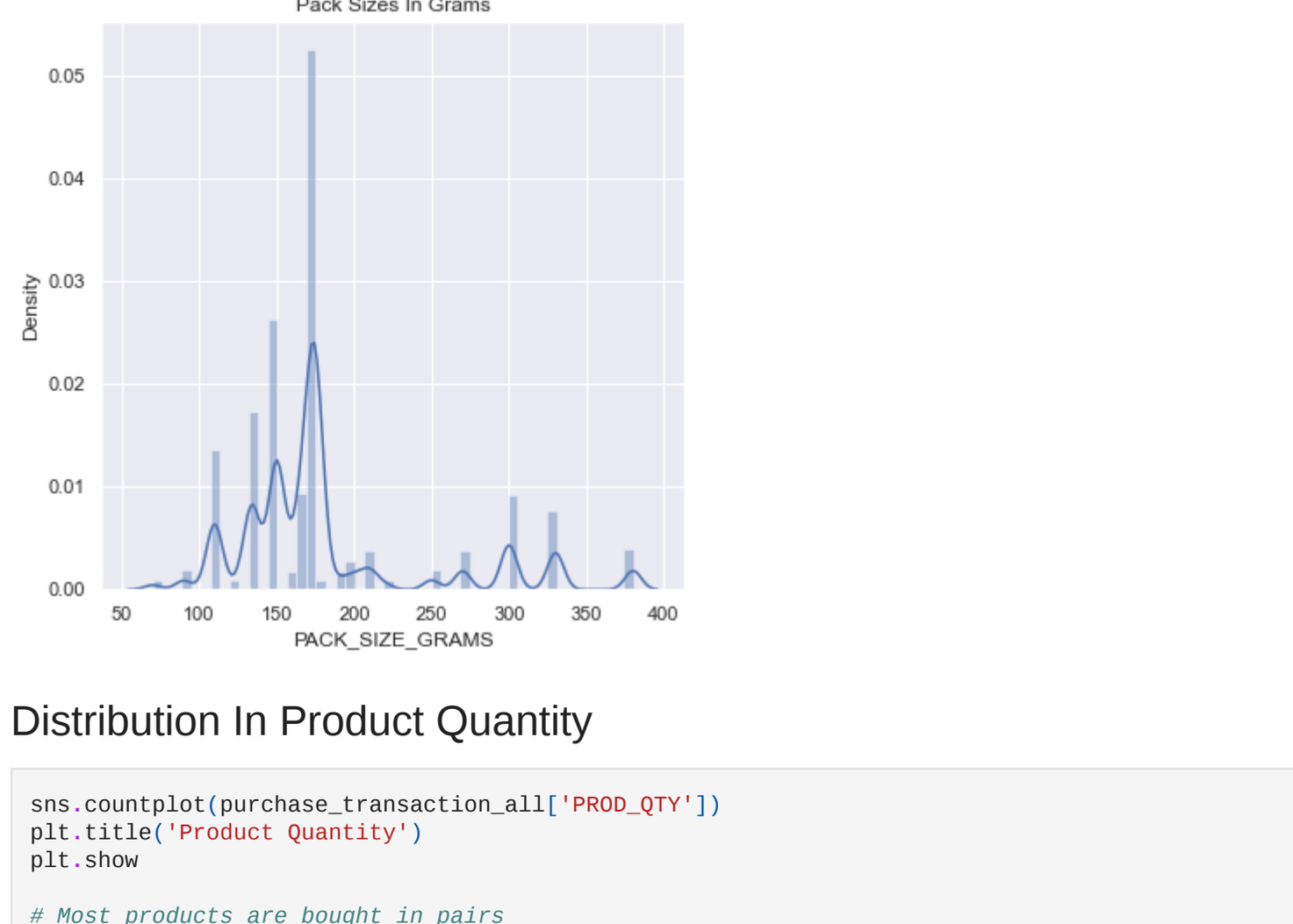


Store_Wise Performance

In [43]:
```
plt.figure(figsize=(12,6))
sns.distplot(purchase_transaction_all.STORE_NBR)
plt.title('Performance Store_wise')
```

```
C:\Users\User\anaconda3\lib\site-packages\seaborn\distributions.py:2619: FutureWarning: `distplot` is a deprecated function and will be removed in a future ve
rsion. Please adapt your code to use either `displot` (a figure-level function with similar flexibility) or `histplot` (an axes-level function for histogram
s).
  warnings.warn(msg, FutureWarning)
```

Out[43]:
```
Text(0.5, 1.0, 'Performance Store_wise')
```

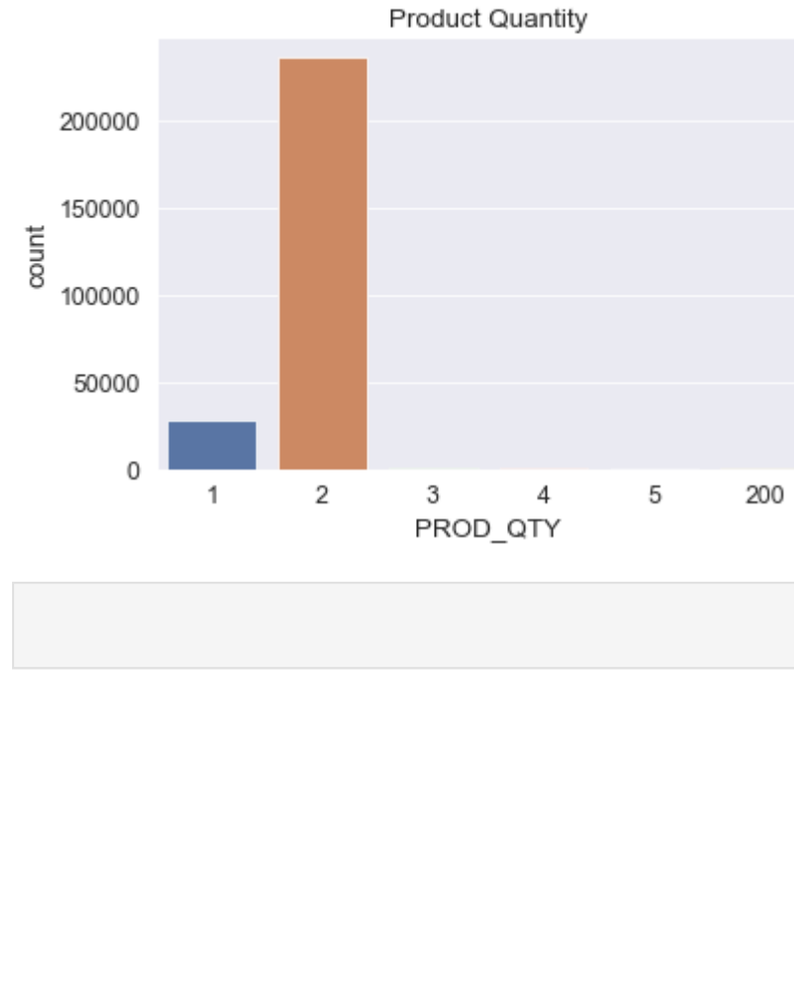


Pack sizes Distribution In Grams

In [44]:
```
plt.figure(figsize=(6,6))
sns.distplot(purchase_transaction_all['PACK_SIZE_GRAMS'])
plt.title('Pack Sizes In Grams')
plt.show
```

```
C:\Users\User\anaconda3\lib\site-packages\seaborn\distributions.py:2619: FutureWarning: `distplot` is a deprecated function and will be removed in a future ve
rsion. Please adapt your code to use either `displot` (a figure-level function with similar flexibility) or `histplot` (an axes-level function for histogram
s).
  warnings.warn(msg, FutureWarning)
```

Out[44]:
```
<function matplotlib.pyplot.show(close=None, block=None)>
```



Distribution In Product Quantity

In [52]:
```
sns.countplot(purchase_transaction_all['PROD_QTY'])
plt.title('Product Quantity')
plt.show

# Most products are bought in pairs
```

```
C:\Users\User\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the on
ly valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[52]:
```
<function matplotlib.pyplot.show(close=None, block=None)>
```


In [ ]: