Quantium Task 1

In [1]:
```python
## Importng Necessary Libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:
```python
#load the dataset
customer = pd.read_csv(r"C:\Users\user\Downloads\QVI_purchase_behaviour.csv")
customer.head()
```

Out[2]:

	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 [3]:
```python
#load the dataset
transaction = pd.read_excel(r"C:\Users\user\Downloads\QVI_transaction_data.xlsx")
transaction.head()
```

Out[3]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	6.0
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese 175g	3	6.3
2	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken 170g	2	2.9
3	2018-08-17	2	2373	974	69	Smiths Chip Thinly S/Cream&Onion 175g	5	15.0
4	2018-08-18	2	2426	1038	108	Kettle Tortilla ChpsHny&Jlpno Chili 150g	3	13.8

Checking Data Types

In [4]:
```python
transaction.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 264836 entries, 0 to 264835
Data columns (total 8 columns):
 #   Column          Non-Null Count   Dtype         
---  ------          --------------   -----         
 0   DATE            264836 non-null  datetime64[ns]
 1   STORE_NBR       264836 non-null  int64         
 2   LYLTY_CARD_NBR  264836 non-null  int64         
 3   TXN_ID          264836 non-null  int64         
 4   PROD_NBR        264836 non-null  int64         
 5   PROD_NAME       264836 non-null  object        
 6   PROD_QTY        264836 non-null  int64         
 7   TOT_SALES       264836 non-null  float64       
dtypes: datetime64[ns](1), float64(1), int64(5), object(1)
memory usage: 16.2+ MB
```

In [5]:
```python
customer.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 72637 entries, 0 to 72636
Data columns (total 3 columns):
 #   Column            Non-Null Count  Dtype 
---  ------            --------------  ----- 
 0   LYLTY_CARD_NBR    72637 non-null  int64 
 1   LIFESTAGE         72637 non-null  object
 2   PREMIUM_CUSTOMER  72637 non-null  object
dtypes: int64(1), object(2)
memory usage: 1.7+ MB
```

Summarization

In [6]:
```python
transaction.describe()
```

Out[6]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_QTY	TOT_SALES
count	264836	264836.00000	2.648360e+05	2.648360e+05	264836.000000	264836.000000	264836.000000
mean	2018-12-30 00:52:12.879215616	135.08011	1.355495e+05	1.351583e+05	56.583157	1.907309	7.304200
min	2018-07-01 00:00:00	1.00000	1.000000e+03	1.000000e+00	1.000000	1.000000	1.500000
25%	2018-09-30 00:00:00	70.00000	7.002100e+04	6.760150e+04	28.000000	2.000000	5.400000
50%	2018-12-30 00:00:00	130.00000	1.303575e+05	1.351375e+05	56.000000	2.000000	7.400000
75%	2019-03-31 00:00:00	203.00000	2.030942e+05	2.027012e+05	85.000000	2.000000	9.200000
max	2019-06-30 00:00:00	272.00000	2.373711e+06	2.415841e+06	114.000000	200.000000	650.000000
std	NaN	76.78418	8.057998e+04	7.813303e+04	32.826638	0.643654	3.083226

In [7]:
```python
customer.describe()
```

Out[7]:

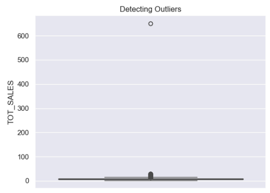
	LYLTY_CARD_NBR
count	7.263700e+04
mean	1.361859e+05
std	8.989293e+04
min	1.000000e+03
25%	6.620200e+04
50%	1.340400e+05
75%	2.033750e+05
max	2.373711e+06

In [8]:
```python
#Checking null values
transaction.isnull().sum()
```

Out[8]:
```
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
```

Finding and Treating Outliers

In [9]:
```python
# Ploting a boxplot to detect outliers
sns.set(style = 'darkgrid')
sns.boxplot(transaction['TOT_SALES'])
plt.title('Detecting Outliers')
plt.show()
```



In [10]:
```python
# Use IQR Methodd to treat outliers
q1,q3 = np.percentile((transaction['TOT_SALES']),[25,75])
iqr = q3-q1
print(f"first Quartile: {q1}")
print(f"second Quartile: {q3}")
print(f"inter Quartile Range: {iqr}")
```

```
first Quartile: 5.4
second Quartile: 9.2
inter Quartile Range: 3.799999999999999
```

In [11]:
```python
# Calculating upper and lower bound so that any datapoints higher than upper bound and lower than lower bound will be called as outliers
upper_bound = q3 + (iqr * 1.5)
lower_bound = q1 - (iqr * 1.5)
print(f"upper_bound: {upper_bound}, lower_bound: {lower_bound}")
```

```
upper_bound: 14.899999999999999, lower_bound: -0.29999999999999805
```

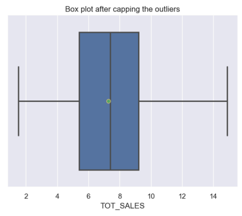
In [12]:
```python
transaction['TOT_SALES'] = transaction['TOT_SALES'].apply(lambda x: np.where(x > upper_bound, upper_bound,x))
```

In [13]:
```python
transaction.head()
```

Out[13]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	6.0
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese 175g	3	6.3
2	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken 170g	2	2.9
3	2018-08-17	2	2373	974	69	Smiths Chip Thinly S/Cream&Onion 175g	5	14.9
4	2018-08-18	2	2426	1038	108	Kettle Tortilla ChpsHny&Jlpno Chili 150g	3	13.8

In [14]:
```python
# final outplot
sns.set(style = 'darkgrid')
sns.boxplot(x= transaction['TOT_SALES'],showmeans= True, linewidth= 2, meanprops= {'marker': 'o', 'markeredgecolor' : 'y'})
plt.title('Box plot after capping the outliers')
plt.show()
```



- Now, we are able to treat outliers successfully and can see there is no outliers in Sales column.

In [15]:
```python
# separate pack size from product name
transaction['PACK_SIZE'] = transaction['PROD_NAME'].str.extract('(\d+)')
```

In [16]:
```python
transaction['PACK_SIZE'].unique()
```

Out[16]:
```
array(['175', '170', '150', '300', '330', '210', '270', '220', '125',
       '110', '134', '380', '180', '165', '135', '250', '200', '160',
       '190', '90', '70'], dtype=object)
```

Merging two tables

In [17]:
```python
New_dataset = pd.merge(transaction, customer, on = 'LYLTY_CARD_NBR').sort_values(by = 'TXN_ID', ascending = True)
```

In [18]:
```python
New_dataset.head()
```

Out[18]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES	PACK_SIZE	LIFESTAGE	PREMIUM_CUSTOMER
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	6.0	175	YOUNG SINGLES/COUPLES	Premium
240665	2018-09-16	1	1002	2	58	Red Rock Deli Chikn&Garlic Aioli 150g	1	2.7	150	YOUNG SINGLES/COUPLES	Mainstream
188932	2019-03-07	1	1003	3	52	Grain Waves Sour Cream&Chives 210G	1	3.6	210	YOUNG FAMILIES	Budget
188933	2019-03-08	1	1003	4	106	Natural ChipCo Hony Soy Chckn175g	1	3.0	175	YOUNG FAMILIES	Budget
102787	2018-11-02	1	1004	5	96	WW Original Stacked Chips 160g	1	1.9	160	OLDER SINGLES/COUPLES	Mainstream

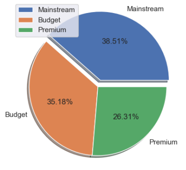
Visualization

- Customer Segmentation

In [19]:
```python
# Total customers in each spending pattern group
segmentation= New_dataset['PREMIUM_CUSTOMER'].value_counts()
segmentation
```

Out[19]:
```
PREMIUM_CUSTOMER
Mainstream    101988
Budget         93157
Premium        69691
Name: count, dtype: int64
```

In [20]:
```python
# Create plot
plt.pie(segmentation, labels= segmentation.index, shadow= True, explode= [0.1,0.0,0.0], autopct='%1.02f%%')
plt.legend(loc= 'best')
plt.title('Customer Segmentation')
plt.show()
```



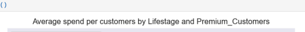
- Average Spend per customers by LIFESTAGE and PREMIUM_CUSTOMER

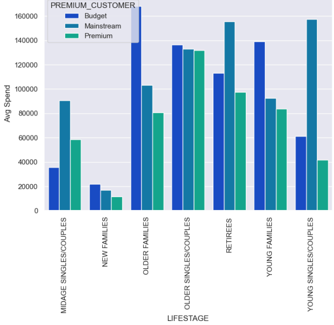
In [30]:
```python
Total_sales = New_dataset.groupby(['LIFESTAGE', 'PREMIUM_CUSTOMER'])['TOT_SALES'].sum().reset_index()
Total_sales
```

Out[30]:

	LIFESTAGE	PREMIUM_CUSTOMER	TOT_SALES
0	MIDAGE SINGLES/COUPLES	Budget	35473.10
1	MIDAGE SINGLES/COUPLES	Mainstream	90640.10
2	MIDAGE SINGLES/COUPLES	Premium	58348.85
3	NEW FAMILIES	Budget	21906.95
4	NEW FAMILIES	Mainstream	16999.95
5	NEW FAMILIES	Premium	11480.30
6	OLDER FAMILIES	Budget	168048.35
7	OLDER FAMILIES	Mainstream	103264.80
8	OLDER FAMILIES	Premium	80569.10
9	OLDER SINGLES/COUPLES	Budget	136544.30
10	OLDER SINGLES/COUPLES	Mainstream	133184.50
11	OLDER SINGLES/COUPLES	Premium	132045.25
12	RETIREES	Budget	112967.00
13	RETIREES	Mainstream	155525.15
14	RETIREES	Premium	97491.00
15	YOUNG FAMILIES	Budget	139133.20
16	YOUNG FAMILIES	Mainstream	92661.35
17	YOUNG FAMILIES	Premium	83911.50
18	YOUNG SINGLES/COUPLES	Budget	61101.50
19	YOUNG SINGLES/COUPLES	Mainstream	157448.20
20	YOUNG SINGLES/COUPLES	Premium	41624.70

In [31]:
```python
# Create plot
sns.set(style= 'darkgrid')
plt.figure(figsize= [8,6])
sns.barplot(x= 'LIFESTAGE', y= 'TOT_SALES', hue= 'PREMIUM_CUSTOMER', data= Total_sales, palette= 'winter')
plt.title('Average spend per customers by Lifestage and Premium_Customers')
plt.ylabel('Avg Spend')
plt.xticks(rotation= 90)
plt.show()
```





- Total number of units bought per customers by LIFESTAGE and PREMIUM_CUSTOMER

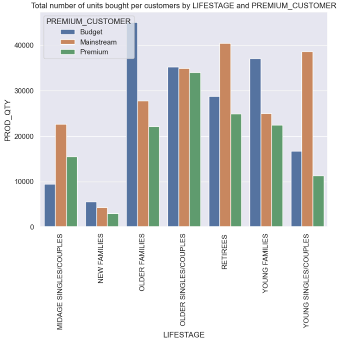
In [33]:

```
Total_units = New_dataset.groupby(['LIFESTAGE', 'PREMIUM_CUSTOMER'])['PROD_QTY'].sum().reset_index()
Total_units
```

Out[33]:

	LIFESTAGE	PREMIUM_CUSTOMER	PROD_QTY
0	MIDAGE SINGLES/COUPLES	Budget	9496
1	MIDAGE SINGLES/COUPLES	Mainstream	22699
2	MIDAGE SINGLES/COUPLES	Premium	15526
3	NEW FAMILIES	Budget	5571
4	NEW FAMILIES	Mainstream	4319
5	NEW FAMILIES	Premium	2957
6	OLDER FAMILIES	Budget	45065
7	OLDER FAMILIES	Mainstream	27756
8	OLDER FAMILIES	Premium	22171
9	OLDER SINGLES/COUPLES	Budget	35220
10	OLDER SINGLES/COUPLES	Mainstream	34997
11	OLDER SINGLES/COUPLES	Premium	33986
12	RETIREES	Budget	28764
13	RETIREES	Mainstream	40518
14	RETIREES	Premium	24884
15	YOUNG FAMILIES	Budget	37111
16	YOUNG FAMILIES	Mainstream	25044
17	YOUNG FAMILIES	Premium	22406
18	YOUNG SINGLES/COUPLES	Budget	16671
19	YOUNG SINGLES/COUPLES	Mainstream	38632
20	YOUNG SINGLES/COUPLES	Premium	11331

In [28]:

```
# Create plot
sns.set(style= 'darkgrid')
plt.figure(figsize= [8,6])
sns.barplot(x= Total_units['LIFESTAGE'], y= Total_units['PROD_QTY'], hue= Total_units['PREMIUM_CUSTOMER'])
plt.title('Total number of units bought per customers by LIFESTAGE and PREMIUM_CUSTOMER')
plt.xticks(rotation= 90)
plt.show()
```