Tasks:

- #### What is the count of Customers segmentation?
- #### What is the count of Customers attributes?
- #### what is the average total sales according to Customer segmentation?
- #### what is the average total sales according to Customers Life stage?
- #### What are the most favorite products brand and size?
- #### Which stores made the heighst total sales?
- #### Which stores made the lowest total sales?
- #### What Customer type buys the most?
- #### At what date Sales are the heighst?
- #### At what date transactions are the heighst?

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

In [2]:
```
behav_data = pd.read_csv('QVI_purchase_behaviour.csv')
trans_data = pd.read_excel('QVI_transaction_data.xlsx')
```

In [3]:
```
behav_data
```

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
...	...	...	...
72632	2370651	MIDAGE SINGLES/COUPLES	Mainstream
72633	2370701	YOUNG FAMILIES	Mainstream
72634	2370751	YOUNG FAMILIES	Premium
72635	2370961	OLDER FAMILIES	Budget
72636	2373711	YOUNG SINGLES/COUPLES	Mainstream

72637 rows × 3 columns

In [4]:
```
behav_data.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
```

In [5]:
```
behav_data.LIFESTAGE.value_counts()
```

Out[5]:
```
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 [6]:
```
behav_data.PREMIUM_CUSTOMER.value_counts()
```

Out[6]:
```
Mainstream    29245
Budget        24470
Premium       18922
Name: PREMIUM_CUSTOMER, dtype: int64
```

In [7]:
```
behav_data.duplicated().unique()
```

Out[7]:
```
array([False])
```

purchase_behaviour data is clean

In [8]:
```
trans_data
```

Out[8]:

	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
...	...	...	...	...	...	...	...	...
264831	43533	272	272319	270088	89	Kettle Sweet Chilli And Sour Cream 175g	2	10.8
264832	43325	272	272358	270154	74	Tostitos Splash Of Lime 175g	1	4.4
264833	43410	272	272379	270187	51	Doritos Mexicana 170g	2	8.8
264834	43461	272	272379	270188	42	Doritos Corn Chip Mexican Jalapeno 150g	2	7.8
264835	43365	272	272380	270189	74	Tostitos Splash Of Lime 175g	2	8.8

264836 rows × 8 columns

In [9]:
```
trans_data.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  int64
 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: float64(1), int64(6), object(1)
memory usage: 16.2+ MB
```

In [10]:
```
trans_data.describe()
```

Out[10]:

	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

In [11]:
```
trans_data.duplicated().value_counts()
```

Out[11]:
```
False    264835
True          1
dtype: int64
```

In [12]:
```
trans_data[trans_data.duplicated(keep=False)]
```

Out[12]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES
124843	43374	107	107024	108462	45	Smiths Thinly Cut Roast Chicken 175g	2	6.0
124845	43374	107	107024	108462	45	Smiths Thinly Cut Roast Chicken 175g	2	6.0

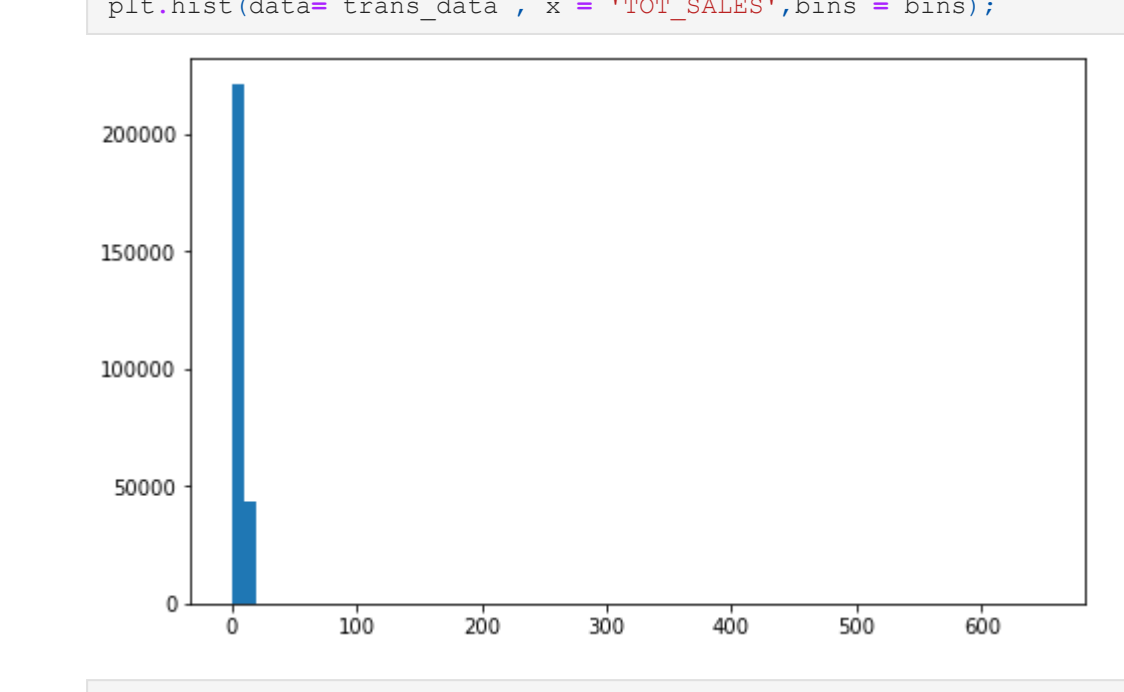
In [13]:
```
trans_data.drop_duplicates(inplace=True)
trans_data.duplicated().value_counts()
```

Out[13]:
```
False    264835
dtype: int64
```

In [14]:
```
trans_data.PROD_NAME.unique()
```

Out[14]:
```
array(['Natural Chip        Compny SeaSalt175g',
       'CCs Nacho Cheese    175g',
       'Smiths Crinkle Cut  Chips Chicken 170g',
       'Smiths Chip Thinly  S/Cream&Onion 175g',
       'Kettle Tortilla ChpsHny&Jlpno Chili 150g',
       'Old El Paso Salsa   Dip Tomato Mild 300g',
       'Smiths Crinkle Chips Salt & Vinegar 330g',
       'Grain Waves         Sweet Chilli 210g',
       'Doritos Corn Chip Mexican Jalapeno 150g',
       'Grain Waves Sour    Cream&Chives 210G',
       'Kettle Sensations   Siracha Lime 150g',
       'Twisties Cheese     270g', 'WW Crinkle Cut      Chicken 175g',
       'Thins Chips Light&  Tangy 175g', 'CCs Original 175g',
       'Burger Rings 220g', 'NCC Sour Cream &    Garden Chives 175g',
       'Doritos Corn Chip Southern Chicken 150g',
       'Cheezels Cheese Box 125g', 'Smiths Crinkle      Original 330g',
       'Infzns Crn Crnchers Tangy Gcamole 110g',
       'Kettle Sea Salt     And Vinegar 175g',
       'Smiths Chip Thinly  Cut Original 175g', 'Kettle Original 175g',
       'Red Rock Deli Thai  Chilli&Lime 150g',
       'Pringles Sthrn FriedChicken 134g', 'Pringles Sweet&Spcy BBQ 134g',
       'Red Rock Deli SR    Salsa & Mzzrlla 150g',
       'Thins Chips         Originl saltd 175g',
       'Red Rock Deli Sp    Salt & Truffle 150G',
       'Smiths Thinly       Swt Chli&S/Cream175G', 'Kettle Chilli 175g',
       'Doritos Mexicana    170g',
       'Smiths Crinkle Cut  French OnionDip 150g',
       'Natural ChipCo      Hony Soy Chckn175g',
       'Dorito Corn Chp     Supreme 380g', 'Twisties Chicken270g',
       'Smiths Thinly Cut   Roast Chicken 175g',
       'Smiths Crinkle Cut  Tomato Salsa 150g',
       'Kettle Mozzarella   Basil & Pesto 175g',
       'Infuzions Thai SweetChili PotatoMix 110g',
       'Kettle Sensations   Camembert & Fig 150g',
       'Smith Crinkle Cut   Mac N Cheese 150g',
       'Kettle Honey Soy    Chicken 175g',
       'Thins Chips Seasonedchicken 175g',
       'Smiths Crinkle Cut  Salt & Vinegar 170g',
       'Infuzions BBQ Rib   Prawn Crackers 110g',
       'GrnWves Plus Btroot & Chilli Jam 180g',
       'Tyrrells Crisps     Lightly Salted 165g',
       'Kettle Sweet Chilli And Sour Cream 175g',
       'Doritos Salsa       Medium 300g', 'Kettle 135g Swt Pot Sea Salt',
       'Pringles SourCream  Onion 134g',
       'Doritos Corn Chips  Original 170g',
       'Twisties Cheese     Burger 250g',
       'Old El Paso Salsa   Dip Chnky Tom Ht300g',
       'Cobs Popd Swt/Chlli &Sr/Cream Chips 110g',
       'Woolworths Mild     Salsa 300g',
       'Natural Chip Co     Tmato Hrb&Spce 175g',
       'Smiths Crinkle Cut  Chips Original 170g',
       'Cobs Popd Sea Salt  Chips 110g',
       'Smiths Crinkle Cut  Chips Chs&Onion170g',
       'French Fries Potato Chips 175g',
       'Old El Paso Salsa   Dip Tomato Med 300g',
       'Doritos Corn Chips  Cheese Supreme 170g',
       'Pringles Original   Crisps 134g',
       'RRD Chilli&         Coconut 150g',
       'WW Original Corn    Chips 200g',
       'Thins Potato Chips  Hot & Spicy 175g',
       'Cobs Popd Sour Crm  &Chives Chips 110g',
       'Smiths Crnkle Chip  Orgnl Big Bag 380g',
       'Doritos Corn Chips  Nacho Cheese 170g',
       'Kettle Sensations   BBQ&Maple 150g',
       'WW D/Style Chip     Sea Salt 200g',
       'Pringles Chicken    Salt Crips 134g',
       'WW Original Stacked Chips 160g',
       'Smiths Chip Thinly  CutSalt/Vinegr175g', 'Cheezels Cheese 330g',
       'Tostitos Lightly    Salted 175g',
       'Thins Chips Salt &  Vinegar 175g',
       'Smiths Crinkle Cut  Chips Barbecue 170g', 'Cheetos Puffs 165g',
       'RRD Sweet Chilli &  Sour Cream 165g',
       'WW Crinkle Cut      Original 175g',
       'Tostitos Splash Of  Lime 175g', 'Woolworths Medium   Salsa 300g',
       'Kettle Tortilla ChpsBtroot&Ricotta 150g',
       'CCs Tasty Cheese    175g', 'Woolworths Cheese   Rings 190g',
       'Tostitos Smoked     Chipotle 175g', 'Pringles Barbeque   134g',
       'WW Supreme Cheese   Corn Chips 200g',
       'Pringles Mystery    Flavour 134g',
       'Tyrrells Crisps     Ched & Chives 165g',
       'Snbts Whlgrn Crisps Cheddr&Mstrd 90g',
       'Cheetos Chs & Bacon Balls 190g', 'Pringles Slt Vingar 134g',
       'Infuzions SourCream&Herbs Veg Strws 110g',
       'Kettle Tortilla ChpsFeta&Garlic 150g',
       'Infuzions Mango     Chutny Papadums 70g',
       'RRD Steak &         Chimuchurri 150g',
       'RRD Honey Soy       Chicken 165g',
       'Sunbites Whlegrn    Crisps Frch/Onin 90g',
       'RRD Salt & Vinegar  165g', 'Doritos Cheese      Supreme 330g',
       'Smiths Crinkle Cut  Snag&Sauce 150g',
       'WW Sour Cream &OnionStacked Chips 160g',
       'RRD Lime & Pepper   165g',
       'Natural ChipCo Sea  Salt & Vinegr 175g',
       'Red Rock Deli Chikn&Garlic Aioli 150g',
       'RRD SR Slow Rst     Pork Belly 150g', 'RRD Pc Sea Salt     165g',
       'Smith Crinkle Cut   Bolognese 150g', 'Doritos Salsa Mild  300g'],
      dtype=object)
```

In [15]:
```
binsize = 10
bins = np.arange(0,trans_data['TOT_SALES'].max()+binsize , binsize)
plt.figure(figsize=[8, 5])
plt.hist(data= trans_data , x = 'TOT_SALES',bins = bins);
```



In [16]:
```
trans_data[trans_data.TOT_SALES > 100].head()
```

Out[16]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES
69762	43331	226	226000	226201	4	Dorito Corn Chp Supreme 380g	200	650.0
69763	43605	226	226000	226210	4	Dorito Corn Chp Supreme 380g	200	650.0

We have 2 outliers that will affect our analysis , we need to drop them

In [17]:
```
trans_data = trans_data[trans_data.TOT_SALES < 100]
trans_data.describe()
```

Out[17]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_QTY	TOT_SALES
count	264833.000000	264833.000000	2.648330e+05	2.648330e+05	264833.000000	264833.000000	264833.000000
mean	43464.036570	135.079529	1.355489e+05	1.351577e+05	56.583598	1.905812	7.299351
std	105.389061	76.784189	8.058003e+04	7.813305e+04	32.826498	0.343437	2.527244
min	43282.000000	1.000000	1.000000e+03	1.000000e+00	1.000000	1.000000	1.500000
25%	43373.000000	70.000000	7.002100e+04	6.760000e+04	28.000000	2.000000	5.400000
50%	43464.000000	130.000000	1.303570e+05	1.351370e+05	56.000000	2.000000	7.400000
75%	43555.000000	203.000000	2.030940e+05	2.027000e+05	85.000000	2.000000	9.200000
max	43646.000000	272.000000	2.373711e+06	2.415841e+06	114.000000	5.000000	29.500000

Changing the date format to a more readable format

In [18]:
```
base_date = pd.Timestamp('1901-01-01')
trans_data = trans_data.copy()
trans_data.loc[:,'DATE'] = [base_date + pd.DateOffset(date_offset) for date_offset in trans_data.DATE]
trans_data.head()
```

Out[18]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES
0	2019-10-19	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	6.0
1	2020-05-15	1	1307	348	66	CCs Nacho Cheese 175g	3	6.3
2	2020-05-21	1	1343	383	61	Smiths Crinkle Cut Chips Chicken 170g	2	2.9
3	2019-08-19	2	2373	974	69	Smiths Chip Thinly S/Cream&Onion 175g	5	15.0
4	2019-08-20	2	2426	1038	108	Kettle Tortilla ChpsHny&Jlpno Chili 150g	3	13.8

In [19]:
```
trans_data['PROD_SIZE(g)'] = trans_data['PROD_NAME'].str.extract(r'([0-9]{1,3})')
trans_data['PROD_SIZE(g)'].value_counts()
```

Out[19]:
```
175    66389
150    43131
134    25102
110    22387
170    19983
165    15297
300    15166
330    12540
380     6416
270     6285
210     6272
200     4473
135     3257
250     3169
90      3008
190     2995
160     2970
220     1564
70      1507
180     1468
125     1454
Name: PROD_SIZE(g), dtype: int64
```

In [20]:
```
trans_data['PROD_BRAND'] = trans_data['PROD_NAME'].str.split().str[0]
trans_data['PROD_BRAND'].value_counts().sort_index()
```

Out[20]:
```
Burger         1564
CCs            4551
Cheetos        2927
Cheezels       4603
Cobs           9693
Dorito         3183
Doritos       24962
French         1418
Grain          6272
GrnWves        1468
Infuzions     11057
Infzns         3144
Kettle        41288
NCC            1419
Natural        6050
Old            9324
Pringles      25102
RRD           11894
Red            5885
Smith          2963
Smiths        28859
Snbts          1576
Sunbites       1432
Thins         14075
Tostitos       9471
Twisties       9454
Tyrrells       6442
WW            10320
Woolworths     4437
Name: PROD_BRAND, dtype: int64
```

In [21]:
```
trans_data['PROD_BRAND'].replace({'Dorito' : 'Doritos','Red':'Red Rock Deli','RRD':'Red Rock Deli','WW':'Woo
                                  ,'Snbts':'Sunbites','Smith':'Smiths','Infzns':'Infuzions','NCC':'Natural C
                                  ,'Natural' :'Natural ChipCo' ,'Old':'Old El Paso','Grain':'Grain Waves','Gr
                                  ,'French':'French Fries','Burger' : 'Burger Rings'},inplace=True)
trans_data['PROD_BRAND'].value_counts()
```

Out[21]:
```
Kettle            41288
Smiths            31822
Doritos           28145
Pringles          25102
Red Rock Deli     17779
Woolworths        14757
Infuzions         14201
Thins             14075
Cobs               9693
Tostitos           9471
Twisties           9454
Old El Paso        9324
Grain Waves        7740
Natural ChipCo     7469
Tyrrells           6442
Cheezels           4603
CCs                4551
Sunbites           3008
Cheetos            2927
Burger Rings       1564
French Fries       1418
Name: PROD_BRAND, dtype: int64
```

In [22]:
```
trans_data['STORE_NBR'] = 'Store ' + trans_data['STORE_NBR'].astype('str')
```

Now the teansactions data is clean enough

Explanatory analysis

Let's merge the two data frames into just one

In [23]:
```
new_df = pd.merge(behav_data,trans_data,on='LYLTY_CARD_NBR')
new_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 264833 entries, 0 to 264832
Data columns (total 12 columns):
 #   Column            Non-Null Count   Dtype
---  ------            --------------   -----
 0   LYLTY_CARD_NBR    264833 non-null  int64
 1   LIFESTAGE         264833 non-null  object
 2   PREMIUM_CUSTOMER  264833 non-null  object
 3   DATE              264833 non-null  datetime64[ns]
 4   STORE_NBR         264833 non-null  object
 5   TXN_ID            264833 non-null  int64
 6   PROD_NBR          264833 non-null  int64
 7   PROD_NAME         264833 non-null  object
 8   PROD_QTY          264833 non-null  int64
 9   TOT_SALES         264833 non-null  float64
 10  PROD_SIZE(g)      264833 non-null  object
 11  PROD_BRAND        264833 non-null  object
dtypes: datetime64[ns](1), float64(1), int64(4), object(6)
memory usage: 26.3+ MB
```

In [24]:
```
new_df
```

Out[24]:

	LYLTY_CARD_NBR	LIFESTAGE	PREMIUM_CUSTOMER	DATE	STORE_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QT
0	1000	YOUNG SINGLES/COUPLES	Premium	2019-10-19	Store 1	1	5	Natural Chip Compny SeaSalt175g	
1	1002	YOUNG SINGLES/COUPLES	Mainstream	2019-09-18	Store 1	2	58	Red Rock Deli Chikn&Garlic Aioli 150g	
2	1003	YOUNG FAMILIES	Budget	2020-03-08	Store 1	3	52	Grain Waves Sour Cream&Chives 210G	
3	1003	YOUNG FAMILIES	Budget	2020-03-09	Store 1	4	106	Natural ChipCo Hony Soy Chckn175g	
4	1004	OLDER SINGLES/COUPLES	Mainstream	2019-11-04	Store 1	5	96	WW Original Stacked Chips 160g	
...	...	...	...	...	...	...	...	...	
264828	2370701	YOUNG FAMILIES	Mainstream	2019-12-10	Store 88	240378	24	Grain Waves Sweet Chilli 210g	
264829	2370751	YOUNG FAMILIES	Premium	2019-10-03	Store 88	240394	60	Kettle Tortilla ChpsFeta&Garlic 150g	
264830	2370961	OLDER FAMILIES	Budget	2019-10-26	Store 88	240480	70	Tyrrells Crisps Lightly Salted 165g	
264831	2370961	OLDER FAMILIES	Budget	2019-10-29	Store 88	240481	65	Old El Paso Salsa Dip Chnky Tom Ht300g	
264832	2373711	YOUNG SINGLES/COUPLES	Mainstream	2019-12-16	Store 88	241815	16	Smiths Crinkle Chips Salt & Vinegar 330g	

264833 rows × 12 columns

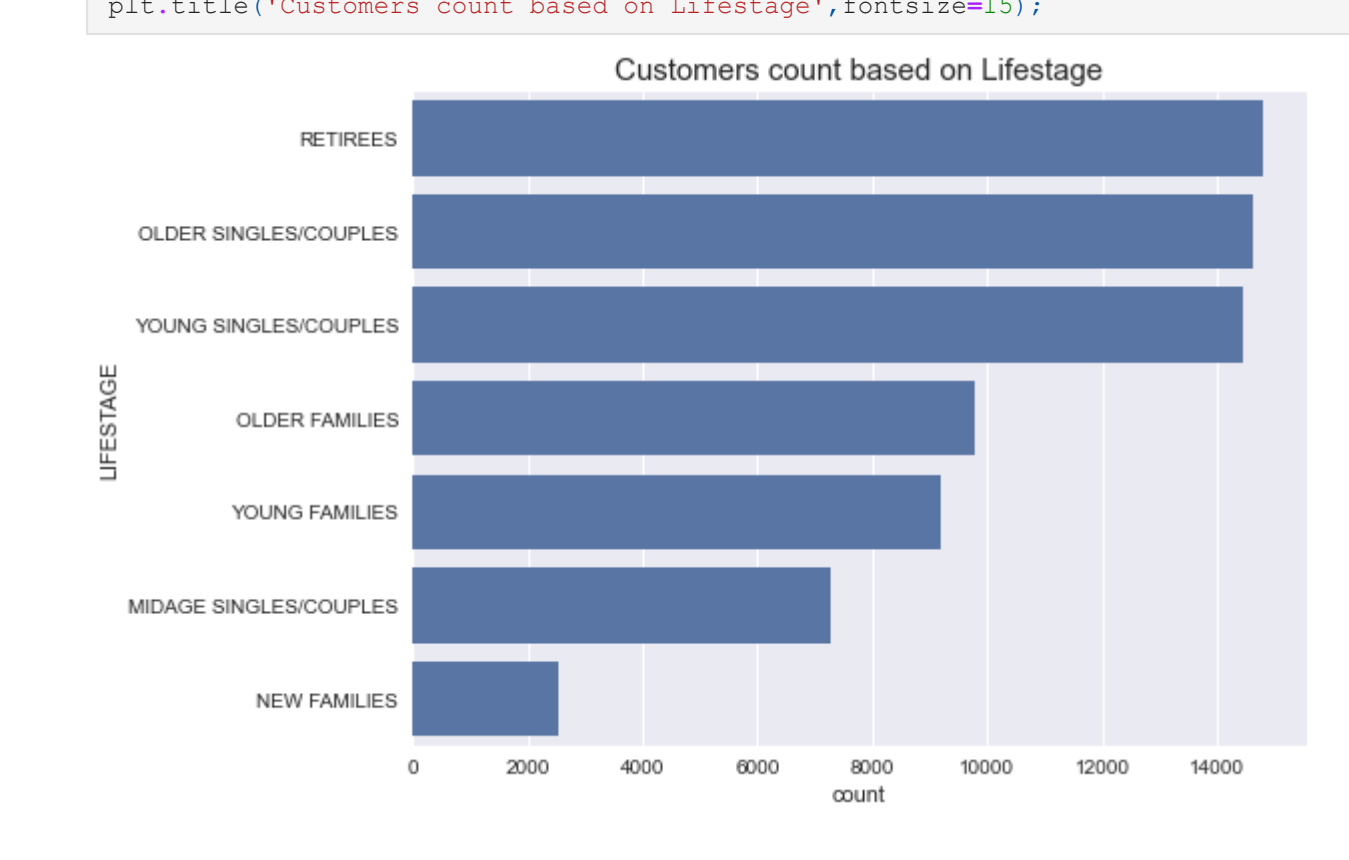
Let's see the count of different customer types

In [28]:
```
unique_members_df = new_df.drop_duplicates(subset=['LYLTY_CARD_NBR'])
plt.style.use('seaborn')
base_color = sb.color_palette()[0]
sb.histplot(unique_members_df['PREMIUM_CUSTOMER'],color=base_color)
plt.xlabel('Customer Segmentation',fontsize=14)
plt.xticks(fontsize=12)
plt.title('Customers count based on Segmentation',fontsize=14);
```

What is the count of Customers segmentation?

> The mainstream customers are the most segmentation while the Premium customers are the lowest

In [29]:
```
plt.figure(figsize=(8,6))

plt.style.use('seaborn')
sb.countplot(y=unique_members_df['LIFESTAGE'],order=unique_members_df['LIFESTAGE'].value_counts().index, col
plt.title('Customers count based on Lifestage',fontsize=15);
```



What is the count of Customers Lifestage?

> According to Lifestage Retires , Older and young single/couples are the most customers more than 14000 each, while New Families are the least about 2000

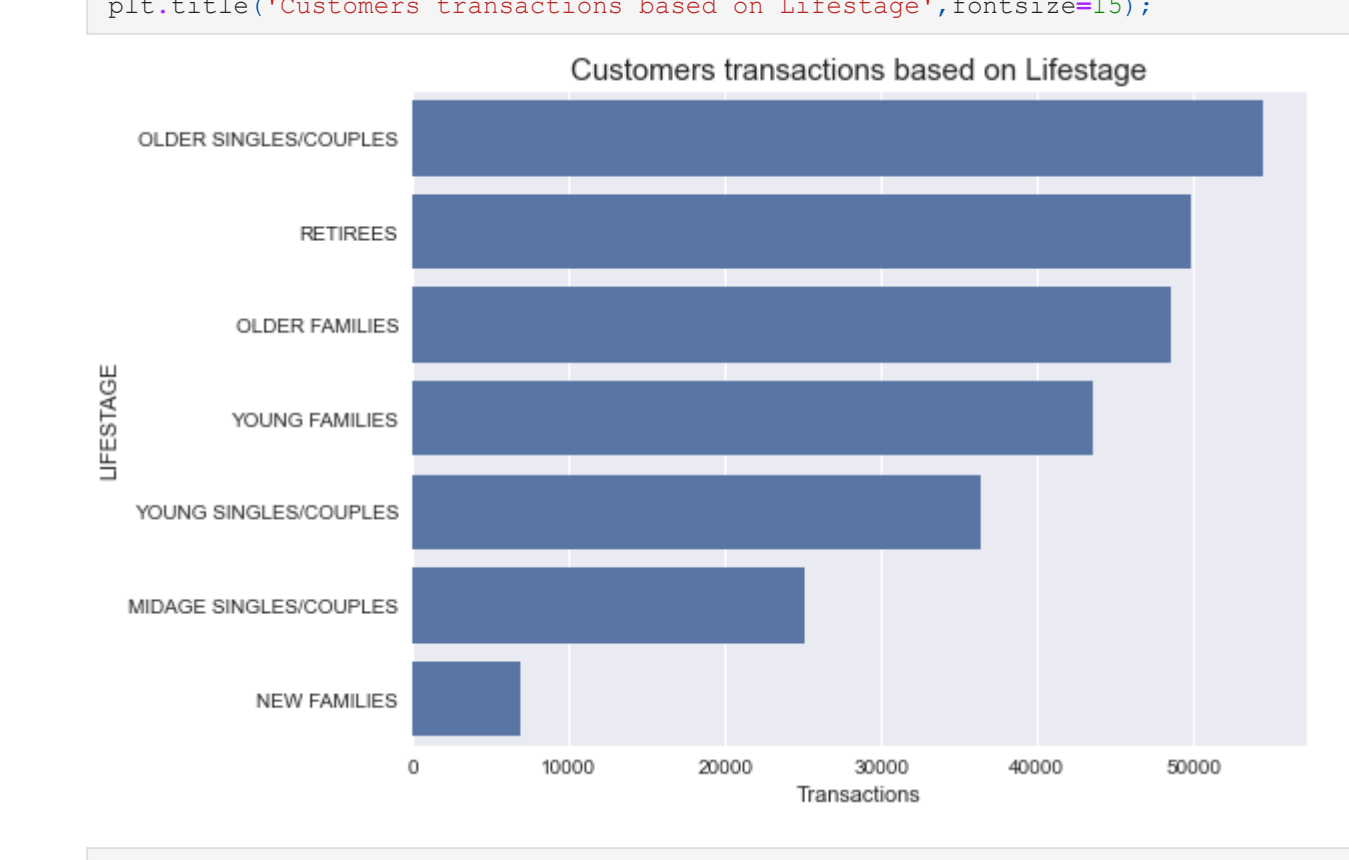
Now let's find out the average total sales according to the customer types

In [30]:
```
plt.figure(figsize=(8,6))
base_color = sb.color_palette()[0]
customer_data =new_df.groupby('PREMIUM_CUSTOMER')['TOT_SALES'].mean()
plt.style.use('seaborn')
sb.barplot(x= customer_data.index, y =customer_data.values,color = base_color)
plt.ylim(7,7.5)
plt.ylabel('average total sales',fontsize=14)
plt.title('Average total sales based on Segmentation',fontsize=14);
```

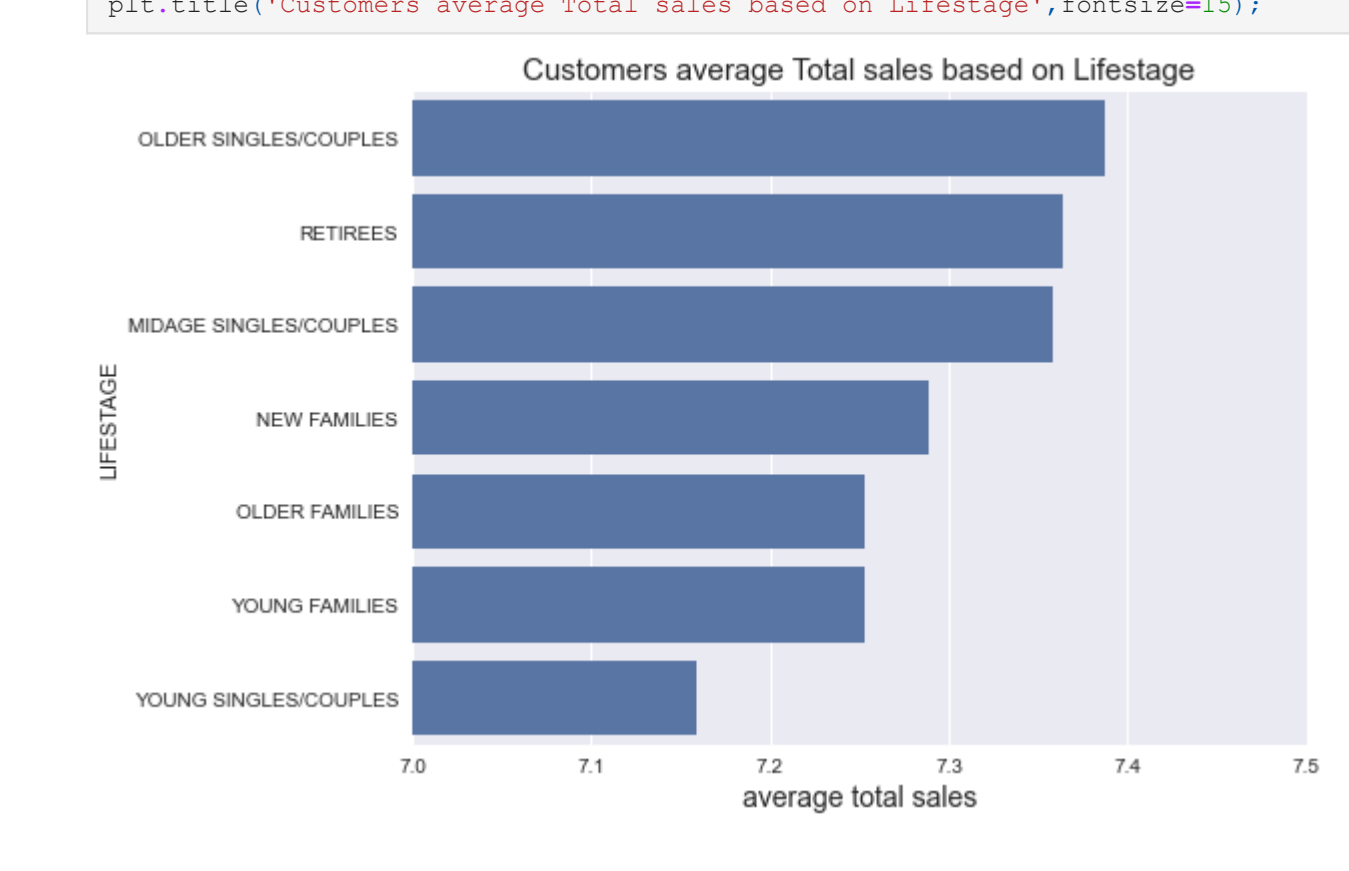
what is the average total sales according to Customer segmentation?

> Mainstream also has the highest average total sales with about 7.35 while Premium and Budget customers are very close to each other with about 7.25

In [31]:
```
plt.figure(figsize=(8,6))
plt.style.use('seaborn')
sb.countplot(y=new_df['LIFESTAGE'],order=new_df['LIFESTAGE'].value_counts().index, color = base_color)
plt.xlabel('Transactions')
plt.title('Customers transactions based on Lifestage',fontsize=15);
```



In [32]:
```
plt.figure(figsize=(8,6))
lifest_data = new_df.groupby('LIFESTAGE')['TOT_SALES'].mean()
plt.style.use('seaborn')
sb.barplot(x= lifest_data.values,y = lifest_data.index, color = base_color
           , order =lifest_data.sort_values(ascending = False).index)
plt.xlim(7,7.5)
plt.xlabel('average total sales',fontsize=14)
plt.title('Customers average Total sales based on Lifestage',fontsize=15);
```

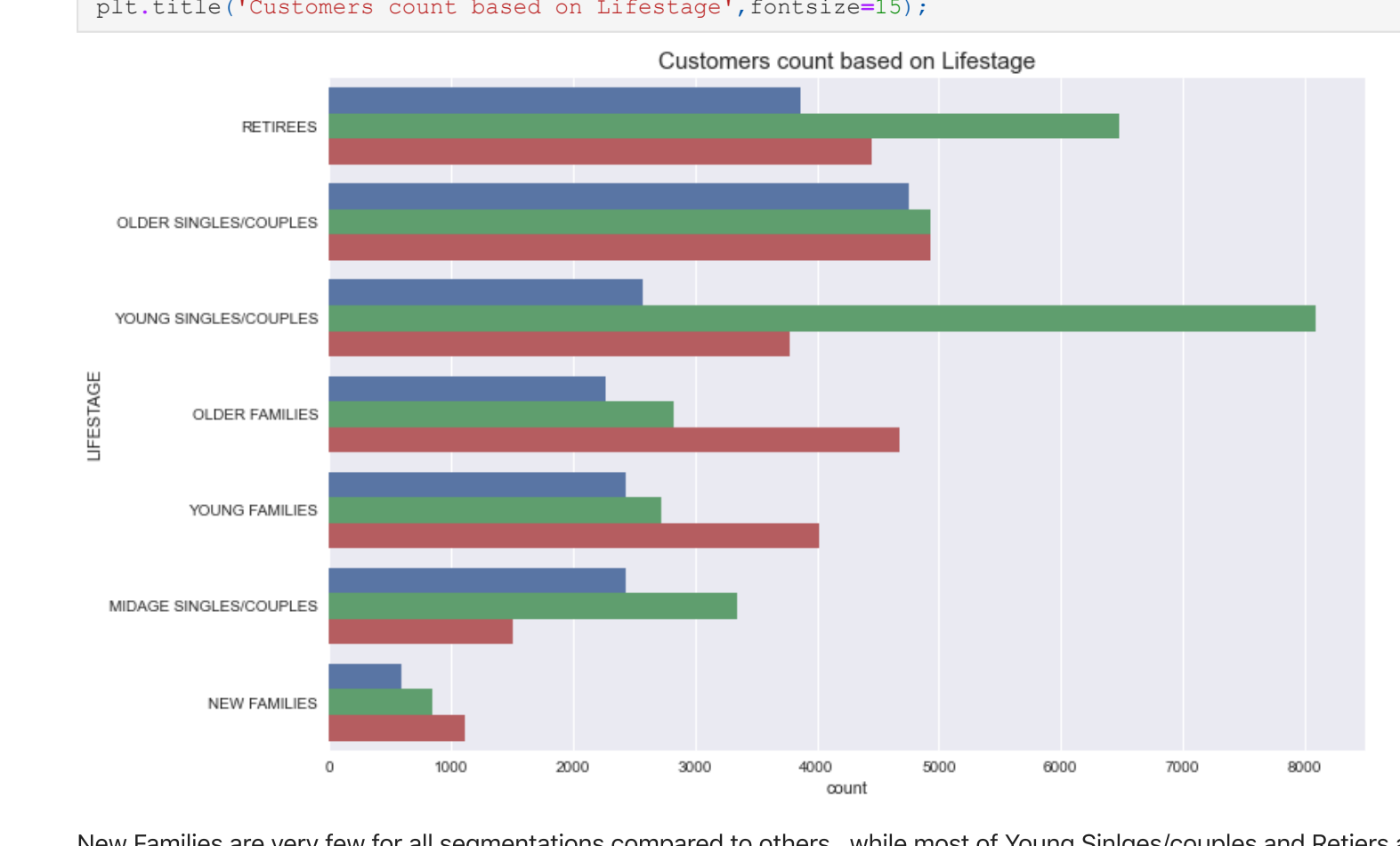


what is the average total sales according to Customers Life stage?

> However Retiers Customers are more than Older singles/couples but the last one made more transantions and more average total sales , and while New families are the least category with fewer transactions but they have high avrage total sales.

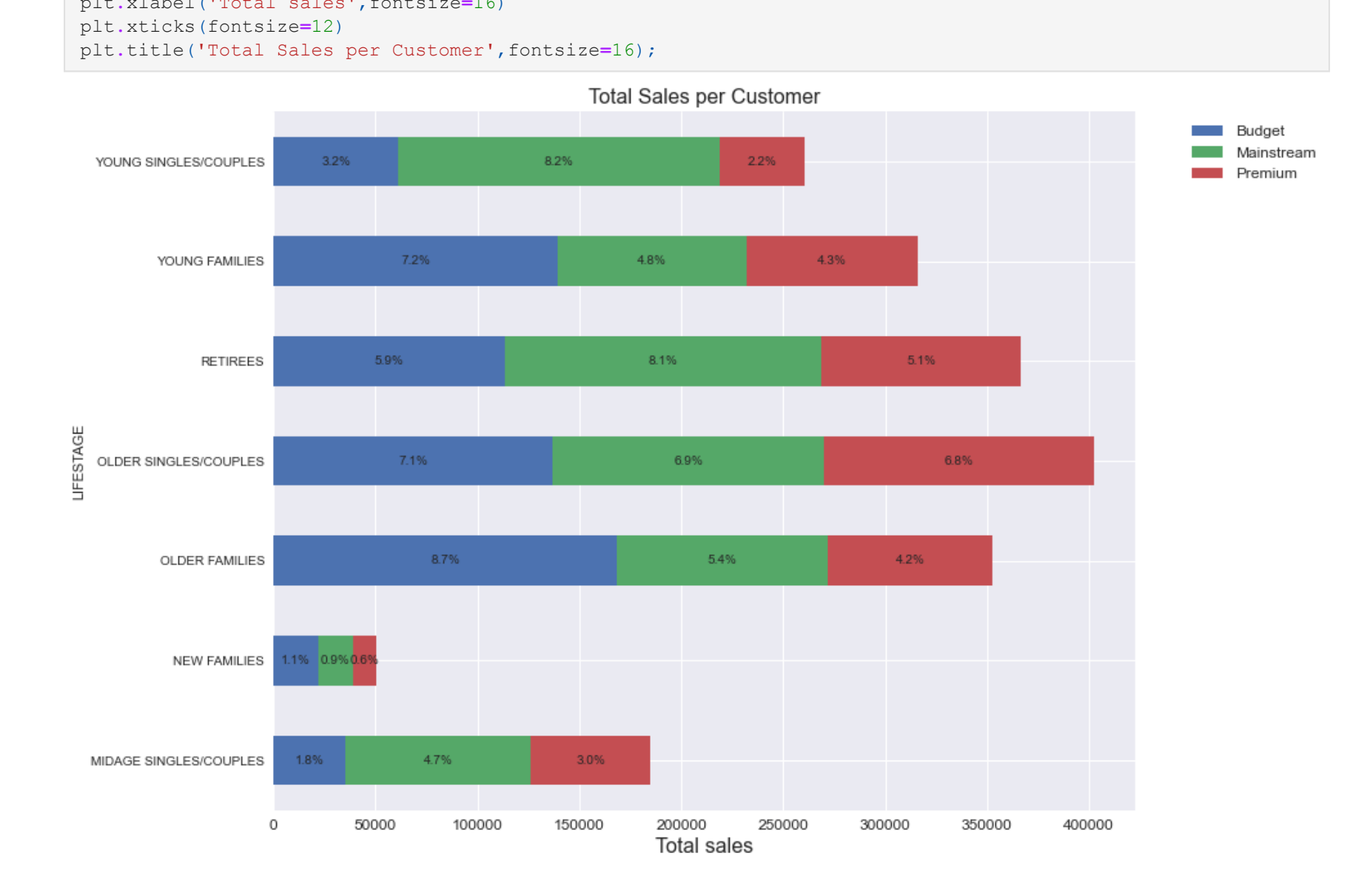
Now let's see the count of each customer lifestage and segmentation

In [33]:
```
plt.figure(figsize=(12,8))
plt.style.use('seaborn')
sb.countplot(y=unique_members_df['LIFESTAGE'],order=unique_members_df['LIFESTAGE'].value_counts().index
             ,hue = unique_members_df['PREMIUM_CUSTOMER'])
plt.legend(bbox_to_anchor=(1.05, 1), loc='upper left',prop={'size': 12})
plt.title('Customers count based on Lifestage',fontsize=15);
```



New Families are very few for all segmentations compared to others , while most of Young Sinlges/couples and Retiers are of the mainstream segmentation , while the Families in general are most on the Budget Customer type

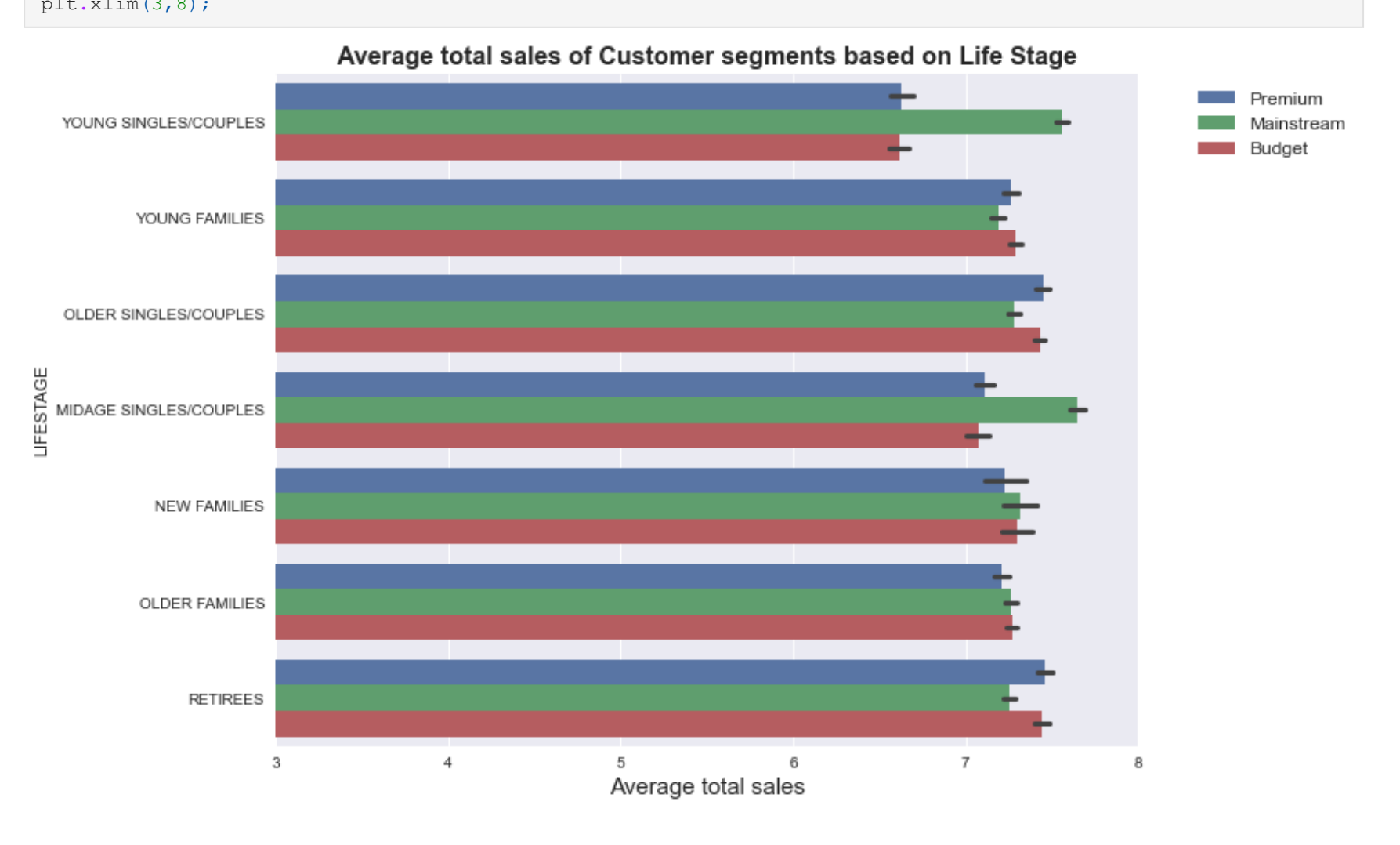
In [103…
```
table = pd.pivot_table(new_df,values='TOT_SALES',index='LIFESTAGE',columns=['PREMIUM_CUSTOMER']
                       ,aggfunc=np.sum)
ax=table.plot(stacked=True,kind='barh',figsize=(12,10))
plt.style.use('seaborn')

index_list = table.index.values
total_sales = new_df['TOT_SALES'].sum()

for i in table.index :
    tot_x = 0
    for j in table.columns:

        ratio = (table.loc[(i)][j])/ total_sales
        x_pos = table.loc[(i)][j]+ tot_x
        tot_x += table.loc[(i)][j]
        plt.text(x = x_pos - table.loc[(i)][j]/2, y = np.where(index_list == i)[0][0]
                 ,s= '%.1f'%(ratio*100)+'%' ,va='center', ha='center', size=10)

plt.legend(bbox_to_anchor=(1.05, 1), loc='upper left',prop={'size': 12})
plt.xlabel('Total sales',fontsize=16)
plt.xticks(fontsize=12)
plt.title('Total Sales per Customer',fontsize=16);
```



what is the Sum of Total sales per customer type?

> According to the total sales New Families make small sales due to their small count while Young Singles/Couples make average total sales despite being a large portion of the total customers population , and the Older single/couples spend the most on total sales, and the Budget Older Families are very valuable customers they spend alot on total sales with reference to their numbers.

In [127…
```
plt.figure(figsize = [10, 8])
plt.style.use('seaborn')
sb.barplot(data=new_df , y='LIFESTAGE',x='TOT_SALES',hue='PREMIUM_CUSTOMER')
plt.legend(bbox_to_anchor=(1.05, 1), loc='upper left',prop={'size': 12})
plt.xlabel('Average total sales',fontsize=15)
plt.title('Average total sales of Customer segments based on Life Stage',fontsize=16, weight='bold')
plt.xlim(3,8);
```

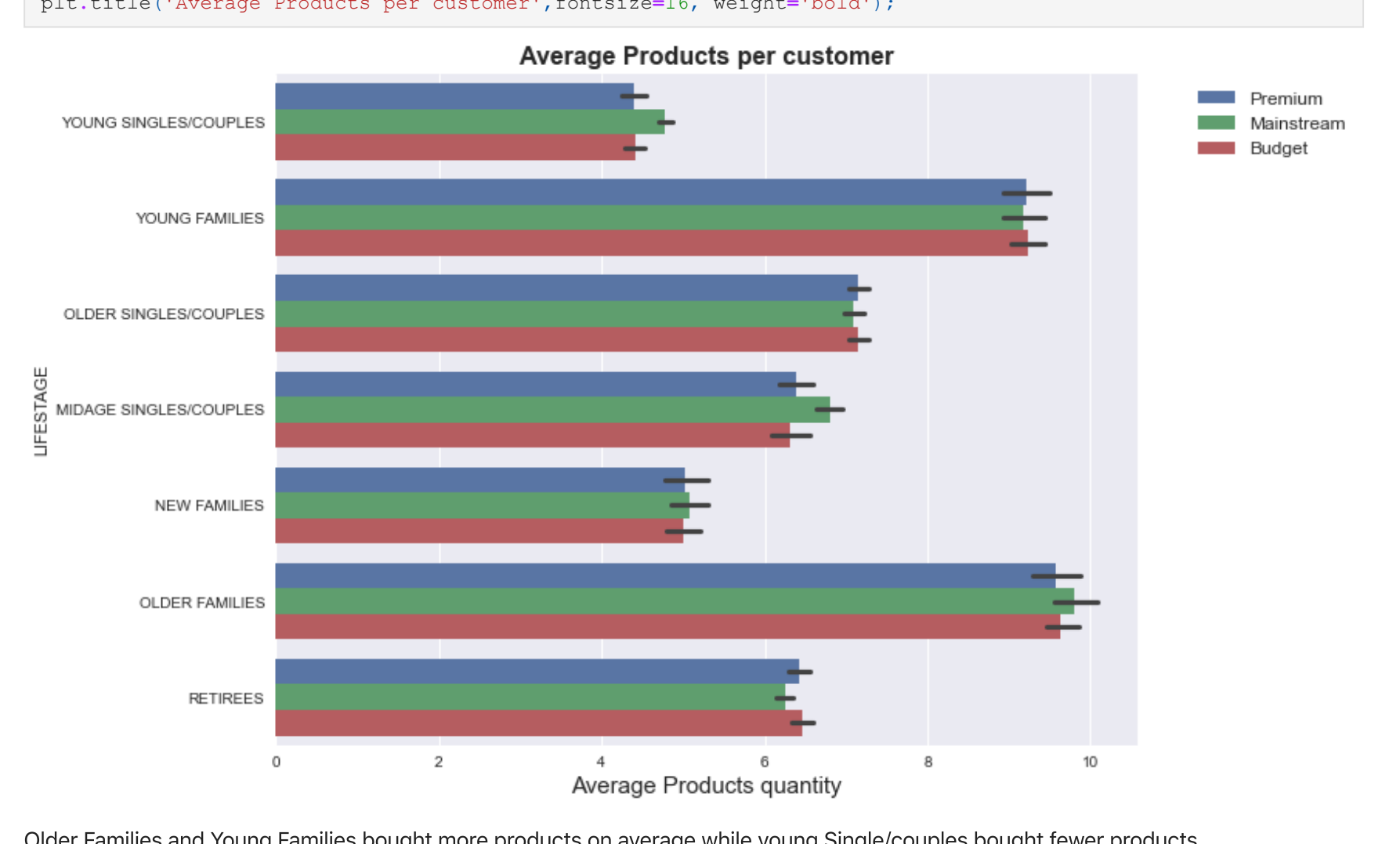


What is the average total sales per customer?

> Young single/couples and Midage single/couples of mainstream segmentation make the highest average total sales while Young single/couples of budget and premium segmentation make the lowest average total sales

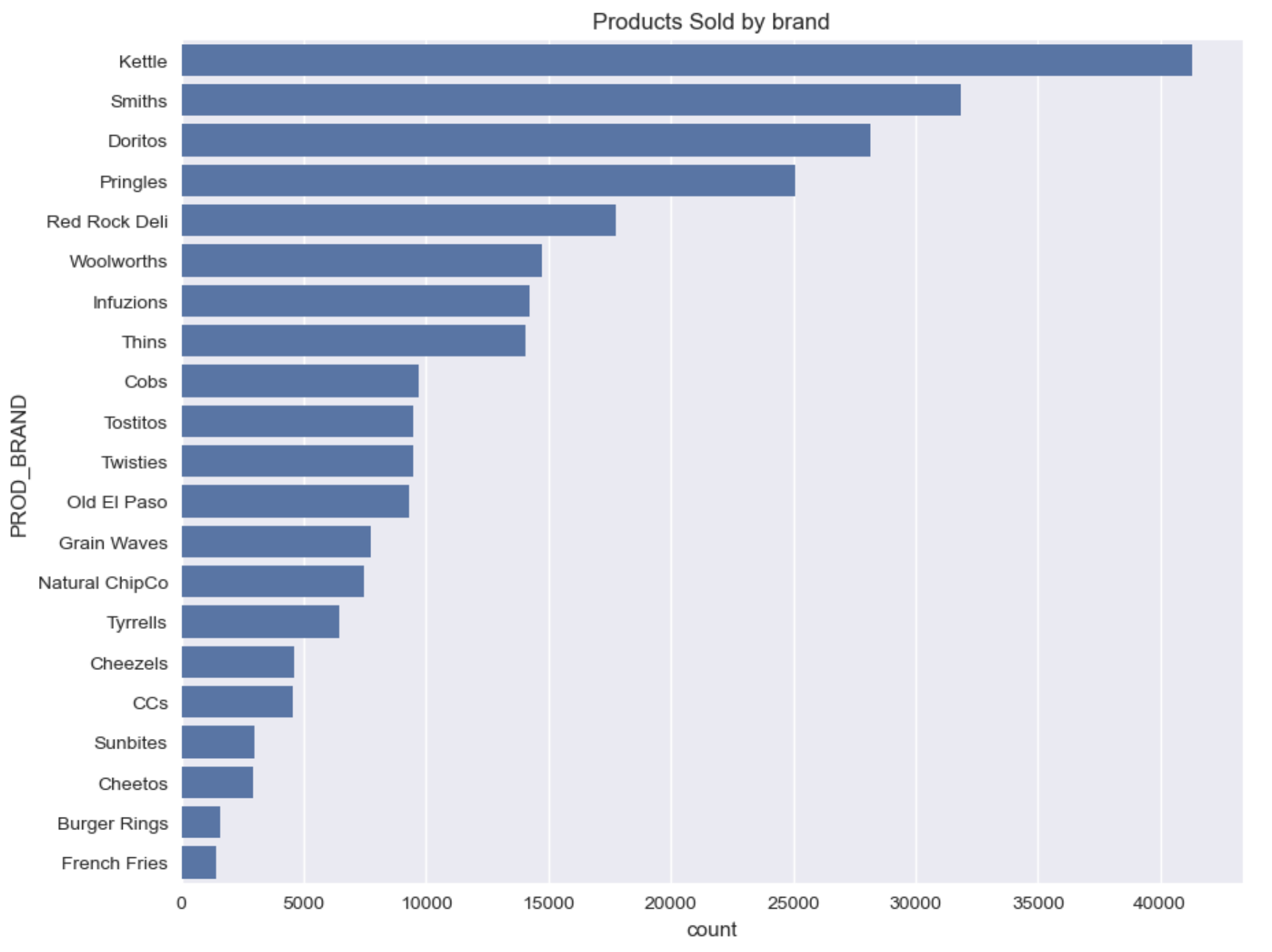
let's see How many products each Customer type bought

In [126…
```
unique_customers = new_df.groupby('LYLTY_CARD_NBR')[['PROD_QTY','LIFESTAGE','PREMIUM_CUSTOMER']].agg({'PROD_
                                                                                                     ,'LIFESTAGE':lambda x:x.u

plt.figure(figsize = [10, 8])
plt.style.use('seaborn')
sb.barplot(data=unique_customers , y='LIFESTAGE',x='PROD_QTY',hue='PREMIUM_CUSTOMER')
plt.legend(bbox_to_anchor=(1.05, 1), loc='upper left',prop={'size': 12})
plt.xlabel('Average Products quantity',fontsize=15)
plt.title('Average Products per customer',fontsize=16, weight='bold');
```



Older Families and Young Families bought more products on average while young Single/couples bought fewer products

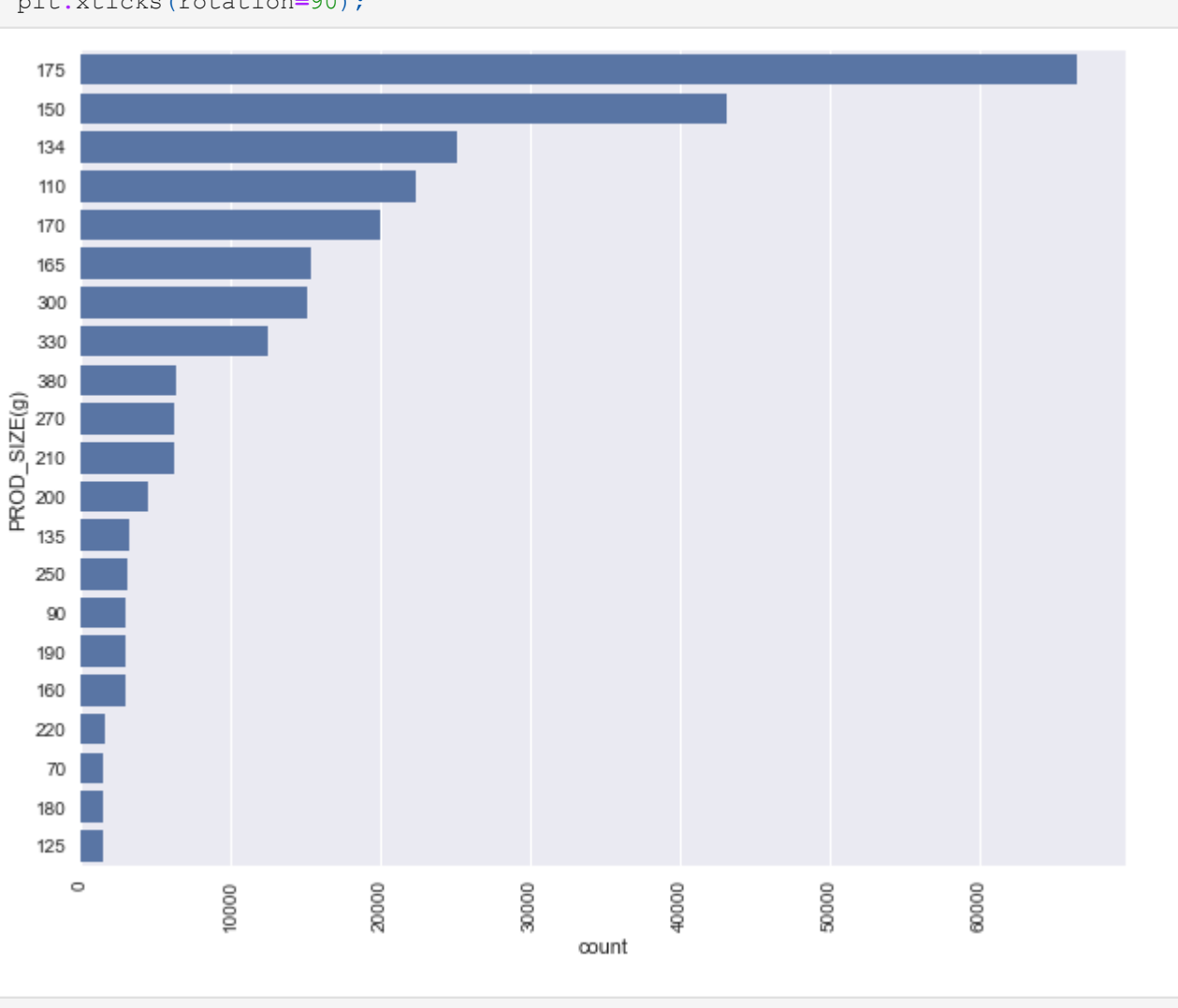
In [75]:
```
plt.figure(figsize=(10,8))
plt.style.use('seaborn')
sb.countplot(y=new_df['PROD_BRAND'],color = base_color , order= new_df['PROD_BRAND'].value_counts().index)
plt.title('Products Sold by brand');
```



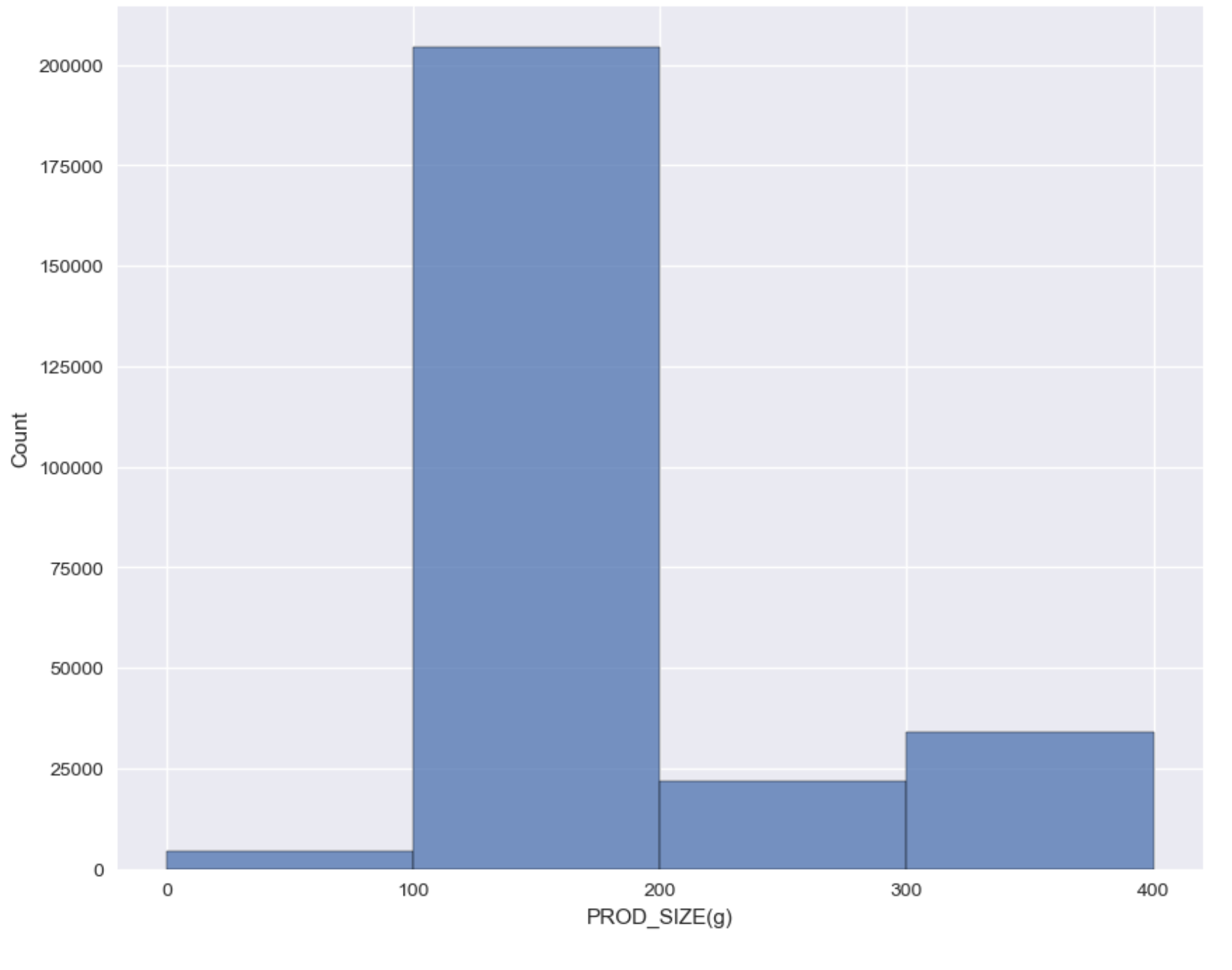
What is the most favorite product brand ?

> Kettle , smiths and Doritos are the most favorite brands while Burger rings , cheetos , and french fries are the least favorite

```
plt.figure(figsize=(10,8))
plt.style.use('seaborn')
sb.countplot(y=new_df['PROD_SIZE(g)'],color = base_color , order= new_df['PROD_SIZE(g)'].value_counts().inde
plt.xticks(rotation=90);
```




```
plt.figure(figsize=(10,8))
plt.style.use('seaborn')
bins = np.arange(0,500,100)
sb.histplot(data=new_df,x=new_df['PROD_SIZE(g)'].astype('int'),bins = bins)
plt.xticks(bins,bins)
plt.title("Count of Products sold based on size range");
```



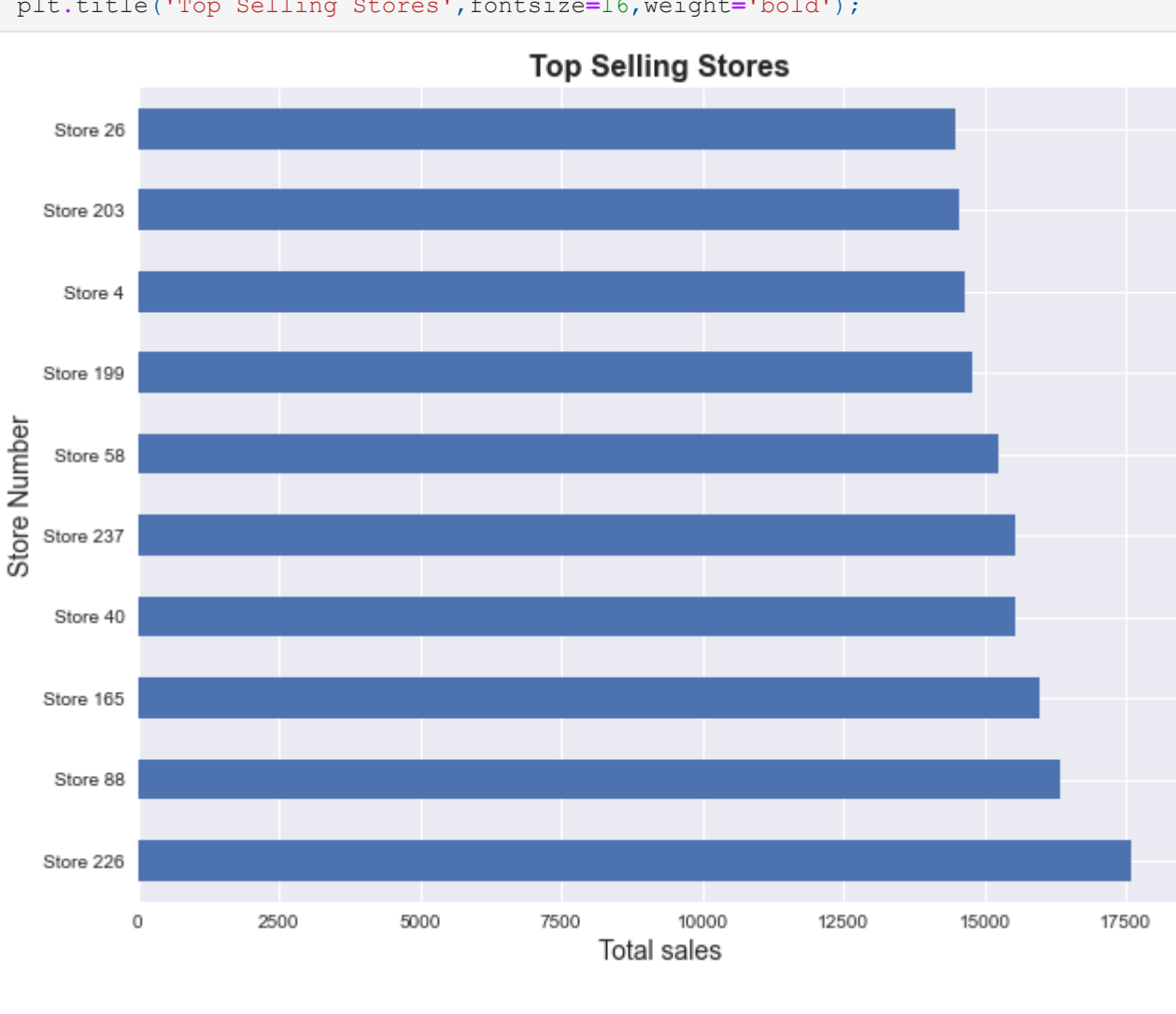
What is the most favorite product size?

> Prodcut of sizes 175,150,134 are the most favorite , while 125,180 and 70g are the least favorite but they may be related not favorite brands , but when we compare ranges we will find that product size from 100g to 200g are the most favorite

Let's see the stores with heighest and lowest profits ?

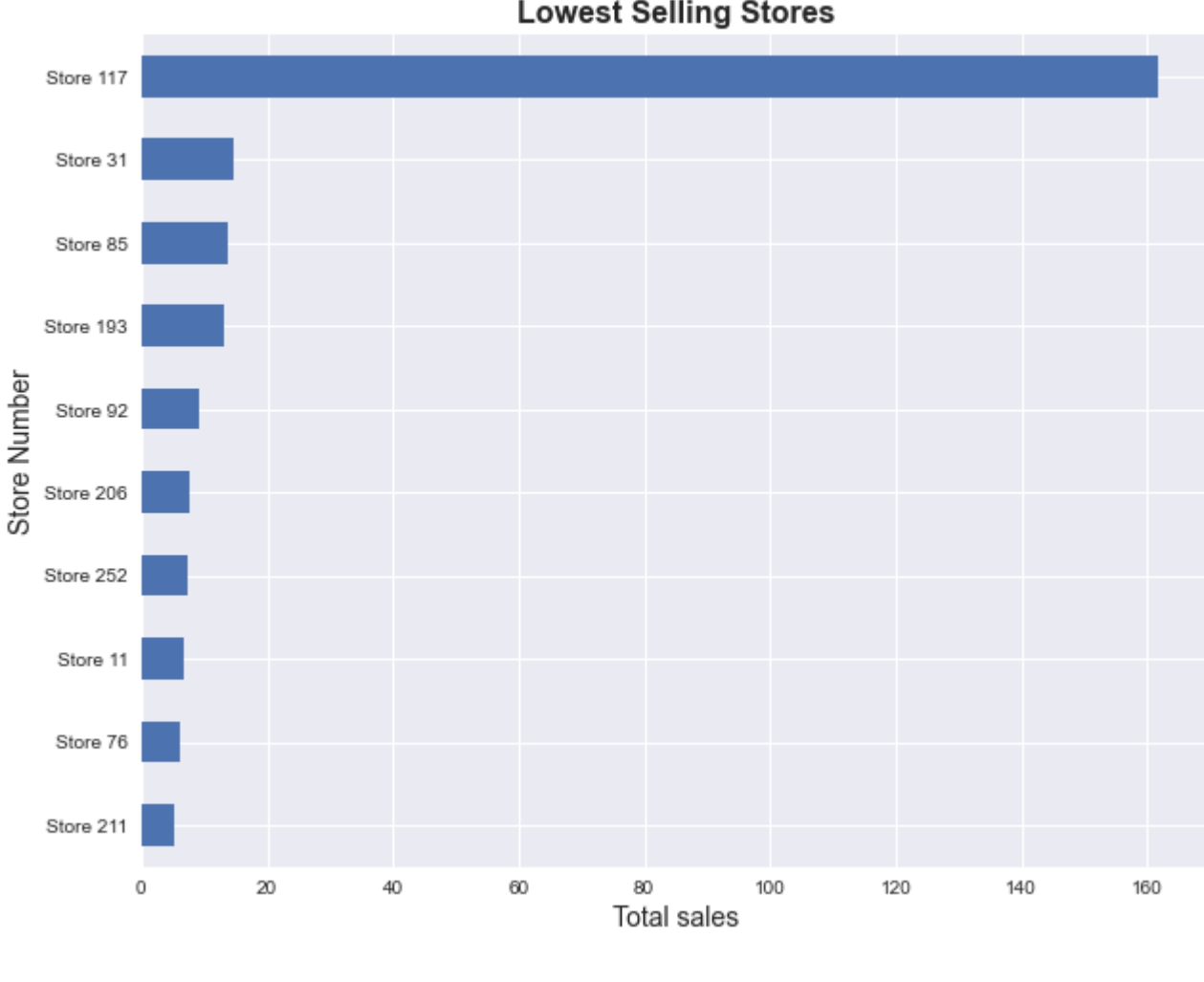
Which stores make the heighst total sales?

```
plt.figure(figsize=(10,8))
plt.style.use('seaborn')
stores_data = new_df.groupby('STORE_NBR')['TOT_SALES'].sum()
stores_data.nlargest(10).plot(kind='barh')
plt.ylabel('Store Number',fontsize=14)
plt.xlabel('Total sales',fontsize=14)
plt.title('Top Selling Stores',fontsize=16,weight='bold');
```



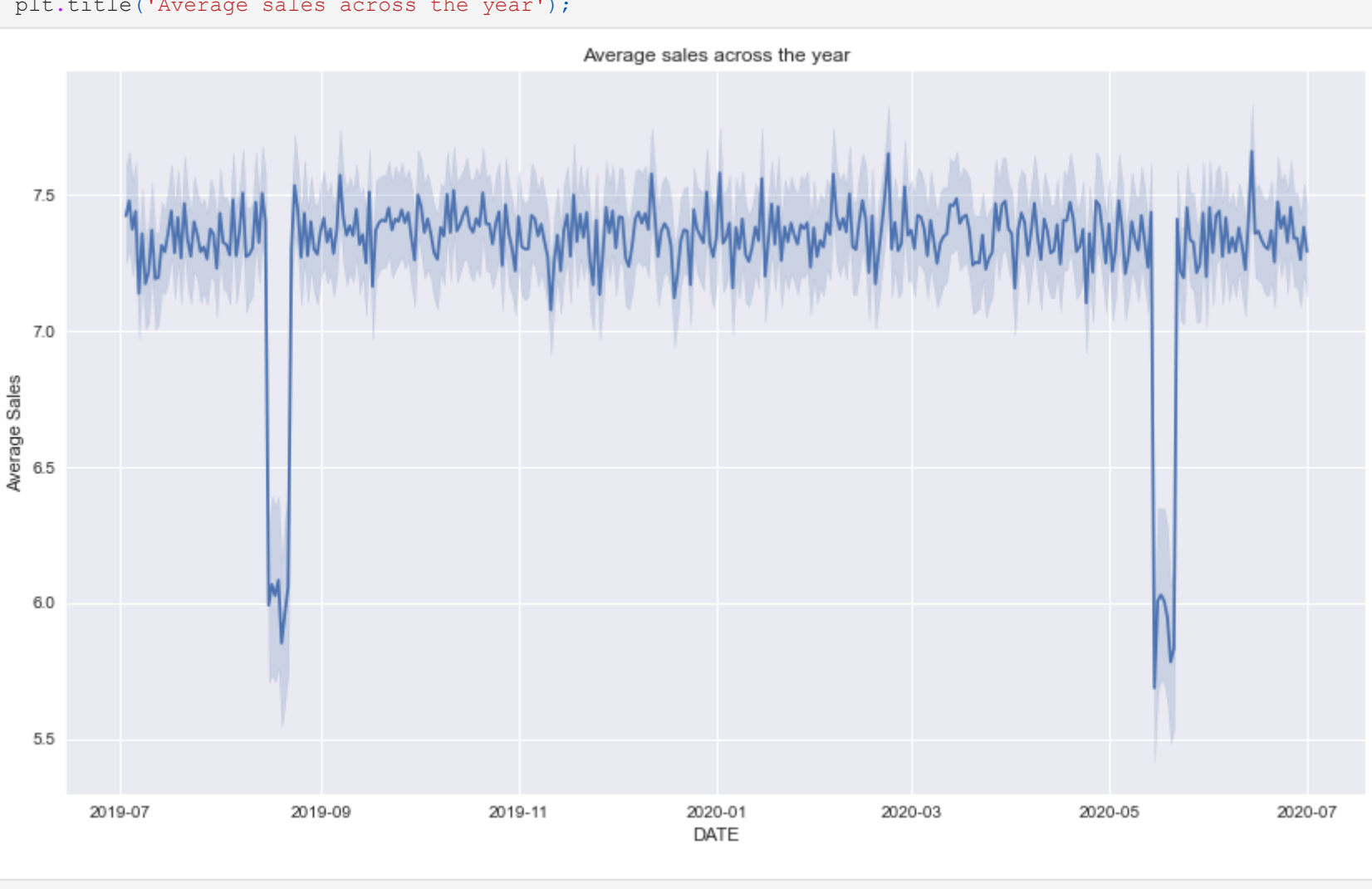
Which stores make the least total sales?

```
plt.figure(figsize=(10,8))
stores_data = new_df.groupby('STORE_NBR')['TOT_SALES'].sum()
plt.style.use('seaborn')
stores_data.nsmallest(10).plot(kind='barh')
plt.ylabel('Store Number',fontsize=14)
plt.xlabel('Total sales',fontsize=14)
plt.title('Lowest Selling Stores',fontsize=16,weight='bold');
```



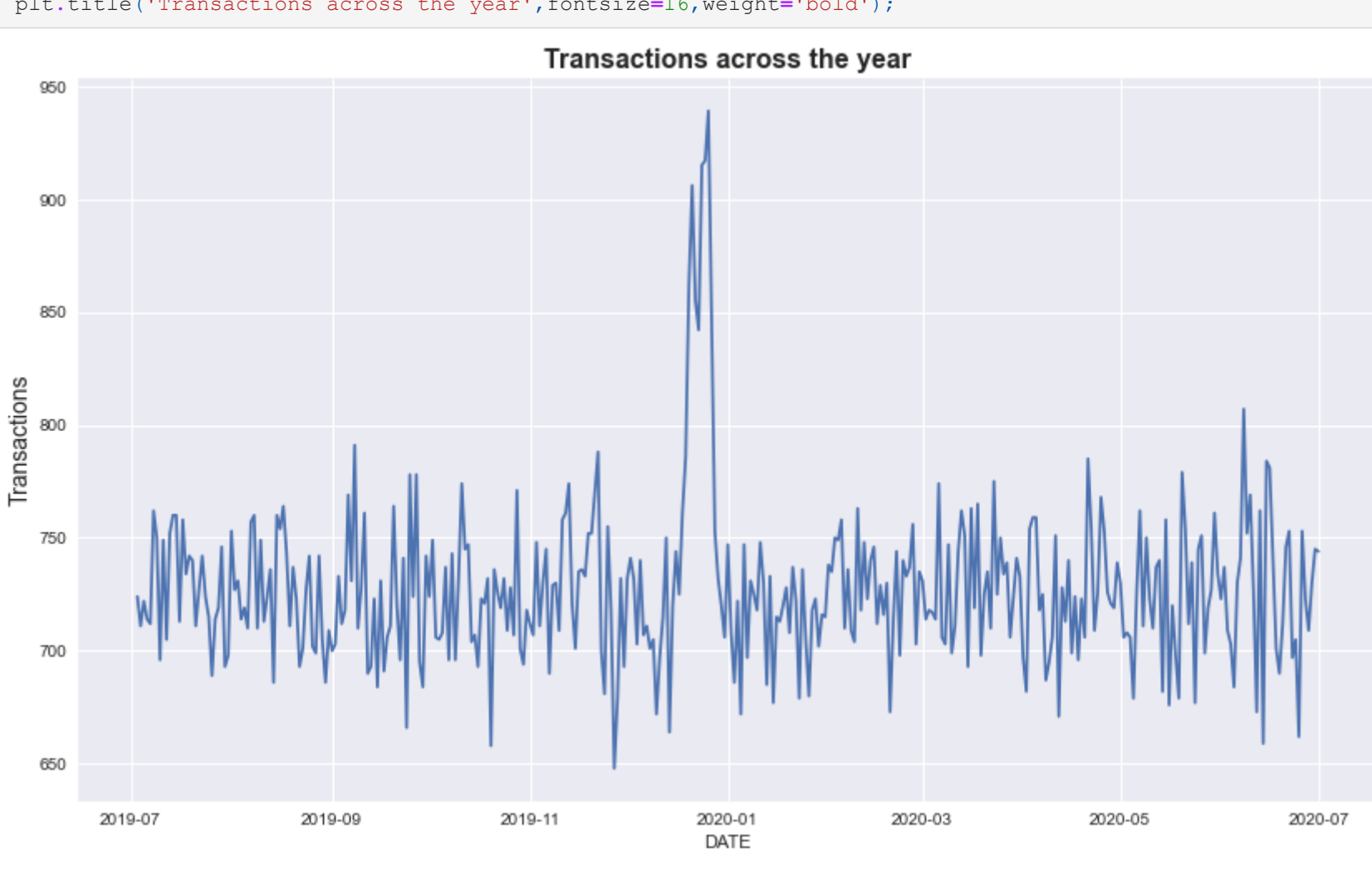
Now i want to analysis Sales and Transactions across the year to see when whey were high or low?

```
plt.figure(figsize=(14,8))
plt.style.use('seaborn')
sb.lineplot(x= new_df['DATE'],y=new_df['TOT_SALES'])
plt.ylabel('Average Sales')
plt.title('Average sales across the year');
```




```
date_df = new_df.groupby('DATE')['TOT_SALES'].sum()
plt.figure(figsize=(14,8))
plt.style.use('seaborn')
sb.lineplot(x= date_df.index,y=date_df.values)
plt.ylabel('Total sales',fontsize=14)
plt.title('Total Sales across the year',fontsize=16,weight='bold');
```


```
trans_date_df = new_df.groupby('DATE')['TXN_ID'].count()
plt.figure(figsize=(14,8))
plt.style.use('seaborn')
sb.lineplot(x= trans_date_df.index,y=trans_date_df.values)
plt.ylabel('Transactions',fontsize=14)
plt.title('Transactions across the year',fontsize=16,weight='bold');
```



At what date Sales and transactions were the heighst?

> We can see that at the end of december 2019 both transactions and total sales were very high as then were the holidays , while at the end of august 2019 and may 2020 the total sales were low despite having the same average transactions rate

Conclusion:

According to customers segmentation :

- We need to attract more new Families customers as they are the least category but they make good average sales.
- We need to Urge the existing Young single/couples especially the Premium and Budget to make more transactions with more total sales.
- Budget Older Families are very valuable customers as they spend alot on total sales with reference to their numbers.

Top product size :

- 175g
- 150g
- 134g

Least product size :

- 125g
- 180g
- 70g

And in general sizes between 100 and 200g are the most favorite

Top prduct brand:

- Kettle
- Smiths
- Pringles

Least Product brand:

- Cheetos
- Burger rings
- French Fries

Dates with highest sales:

- December 2019

Dates with lowest sales:

- august 2019 and may 2020