In [1]:
```
#import all the necessary libraries
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
import warnings
warnings.filterwarnings('ignore')
```

In [2]:
```
sales = pd.read_csv('supermarket_sales .csv')
```

Q1.Show first 5 records of dataset?

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

Out[3]:

	Invoice ID	Branch	City	Customer type	Gender	Product line	Unit price	Quantity	Tax 5%	Total
0	750-67-8428	A	Yangon	Member	Female	Health and beauty	74.69	7	26.1415	548.9715
1	226-31-3081	C	Naypyitaw	Normal	Female	Electronic accessories	15.28	5	3.8200	80.2200
2	631-41-3108	A	Yangon	Normal	Male	Home and lifestyle	46.33	7	16.2155	340.5255
3	123-19-1176	A	Yangon	Member	Male	Health and beauty	58.22	8	23.2880	489.0480
4	373-73-7910	A	Yangon	Normal	Male	Sports and travel	86.31	7	30.2085	634.3785

In [4]:
```
sales['Branch'].ndim
```

Out[4]: 1

In [5]:
```
sales.ndim
```

Out[5]: 2

Q2.How many records and columns are in dataset?

In [6]:
```
sales.shape
```

Out[6]: (1000, 17)

1000 records and 17 columns

Q3.Show the datatypes of different columns.handle the missing values.

In [7]:
```
sales.dtypes
```

Out[7]:
```
Invoice ID                 object
Branch                     object
City                       object
Customer type              object
Gender                     object
Product line               object
Unit price                float64
Quantity                    int64
Tax 5%                    float64
Total                     float64
Date                       object
Time                       object
Payment                    object
cogs                      float64
gross margin percentage   float64
gross income              float64
Rating                    float64
dtype: object
```

In [8]:
```
# handle the missing values.
sales.isnull().sum()
```

Out[8]:
```
Invoice ID                0
Branch                    0
City                      0
Customer type             0
Gender                    0
Product line              0
Unit price                0
Quantity                  0
Tax 5%                    0
Total                     0
Date                      0
Time                      0
Payment                   0
cogs                      0
gross margin percentage   0
gross income              0
Rating                    0
dtype: int64
```

no null values

Q4.What was the total number of sales? What branch has the highest number of sales?

In [9]:
```
# i) Total number of sales
sales['Total'].count()
```

Out[9]:
```
1000
```

In [10]:
```
# ii) what branch has the highest number of sales?
sales['Branch'].value_counts()
# or sales['Branch'].mode()
```

Out[10]:
```
A    340
B    332
C    328
Name: Branch, dtype: int64
```

Branch A has highest number of sales

Q5.What type of product is sold the most?

In [11]:
```
sales['Product line'].value_counts()
# or sales['Product line'].mode()
```

Out[11]:
```
Fashion accessories       178
Food and beverages        174
Electronic accessories    170
Sports and travel         166
Home and lifestyle        160
Health and beauty         152
Name: Product line, dtype: int64
```

most type of product sold is Fashion accessories

Q6.What is the average sales of electoniv=cs accessories?

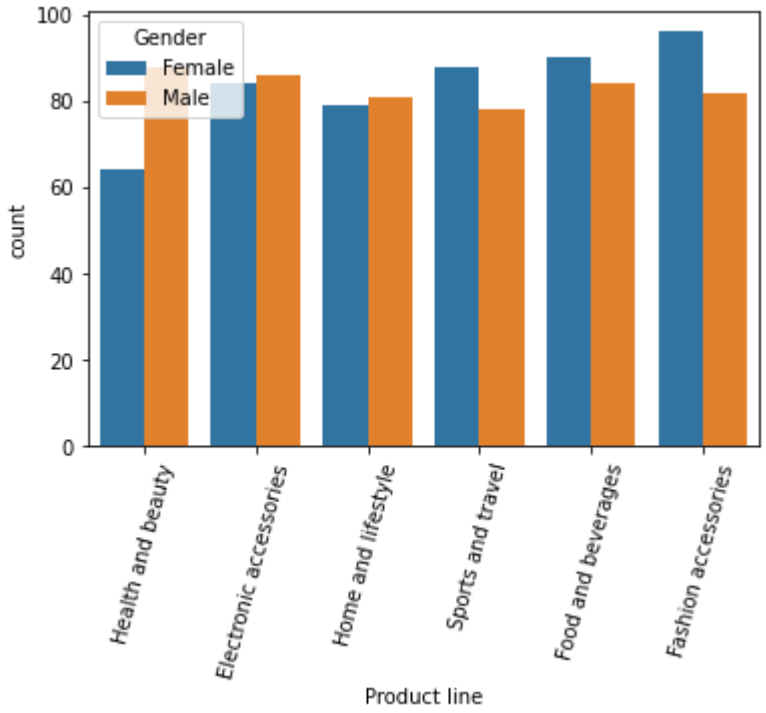
In [12]:
```
g = sales.groupby('Product line')
g.get_group('Electronic accessories')['Total'].mean()
```

Out[12]:
```
319.6325382352942
```

average sale of electronic accessories = 319.63

Q7.What gender buy more items in each category? what is the category?

In [13]:
```
sns.countplot(sales['Product line'],hue = sales['Gender'])
plt.xticks(rotation = 75)
plt.show()
```



1. In Health and beauty Male bought more items than female
2. In Electronic accessories Male bought more items than female
3. In Home and lifestyle Male bought more items than female
4. In Sports and travel FeMale bought more items than male
5. In Food and beverages FeMale bought more items than male
6. In Fashion accessories FeMale bought more items than male

Q8.What is the favorite method of payment of the members? of the normal customers?

In [14]:
```
normal_members = sales.loc[sales['Customer type']=='Normal']
normal_members['Payment'].mode()
```

Out[14]:
```
0    Ewallet
Name: Payment, dtype: object
```

Ewallet is favorite method of payment of the members of the normal customers

Q9.What time should we display an advertisement to maximize the revenue?

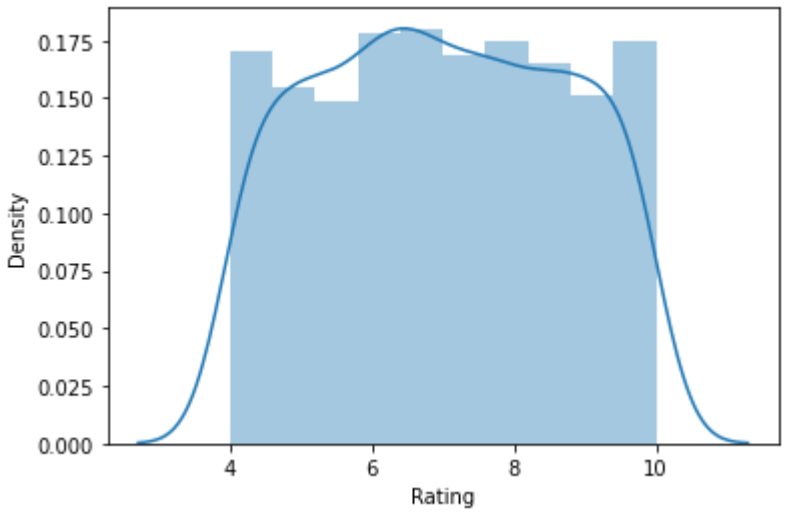
In [15]:
```
sales['Time'].mode()
```

Out[15]:
```
0    14:42
1    19:48
Name: Time, dtype: object
```

around 14:42 and 19:48 we should display an advertisement to maximize the revenue

Q10.What does the customer rating look like and is it skewed?

In [16]:
```
sns.distplot(sales['Rating'])
plt.show()
```

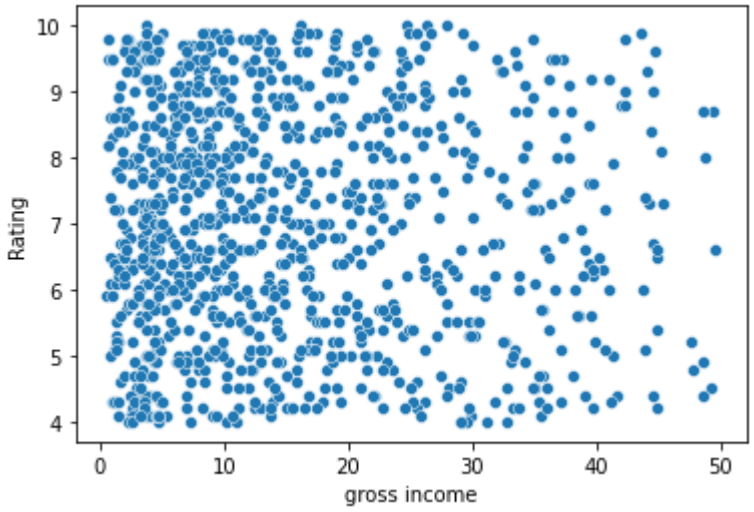


most of the ratings are between 4 and 10 and they are neither left skewed nor right skewed

Q11.Does gross income affect the ratings that the customers provide?

In [17]:
```
sns.scatterplot(x = sales['gross income'],y =sales['Rating'])
```

Out[17]:
```
<AxesSubplot:xlabel='gross income', ylabel='Rating'>
```



In [18]:
```
sales['gross income'].corr(sales['Rating'])
```

Out[18]:
```
-0.03644170499701838
```

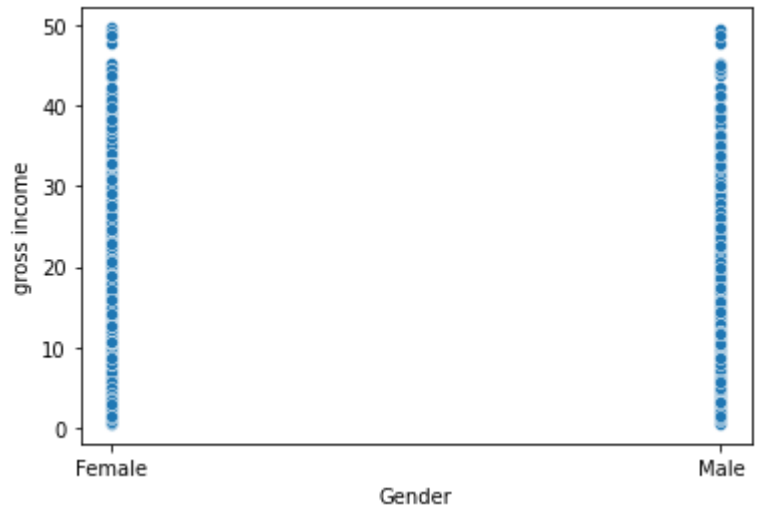
from the scatterplot we can say that gross income doesnt affect the ratings that the customers provide

however from correlation it is found that relation between gross income and rating is weakly negative

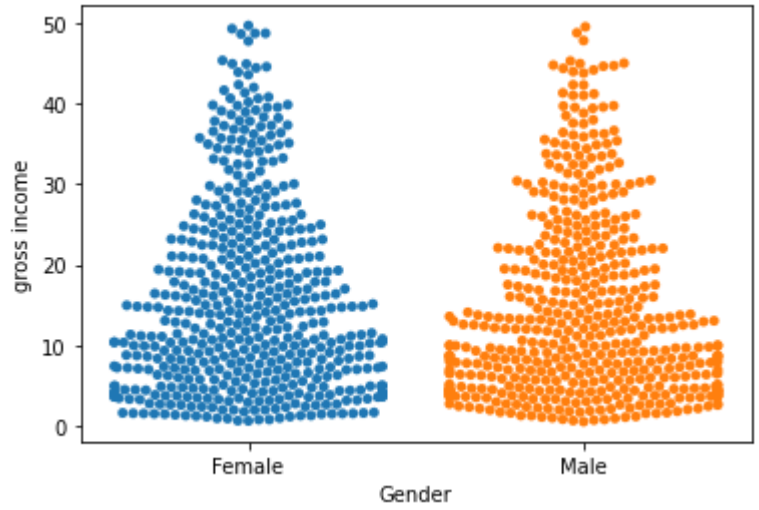
which means gross income at very low level affects the ratings(as the gross income increases hardly noticeable ratings decreases)

Q12.Is there any relationship between Gender and Gross income?

In [19]:
```
sns.scatterplot(x = sales['Gender'],y = sales['gross income'])
plt.show()
```



In [20]:
```
sns.swarmplot(x=sales['Gender'] ,y = sales['gross income'])
plt.show()
```



from the interpreting both graphs we can say that there is no relationship between gender and gross income

Q13.What is the spending pattern of females and males and in which category do they spend a lot?

In [23]:
```
x=sales.groupby(['Gender','Product line'])['Total'].sum().sort_values(ascending=F
x
```

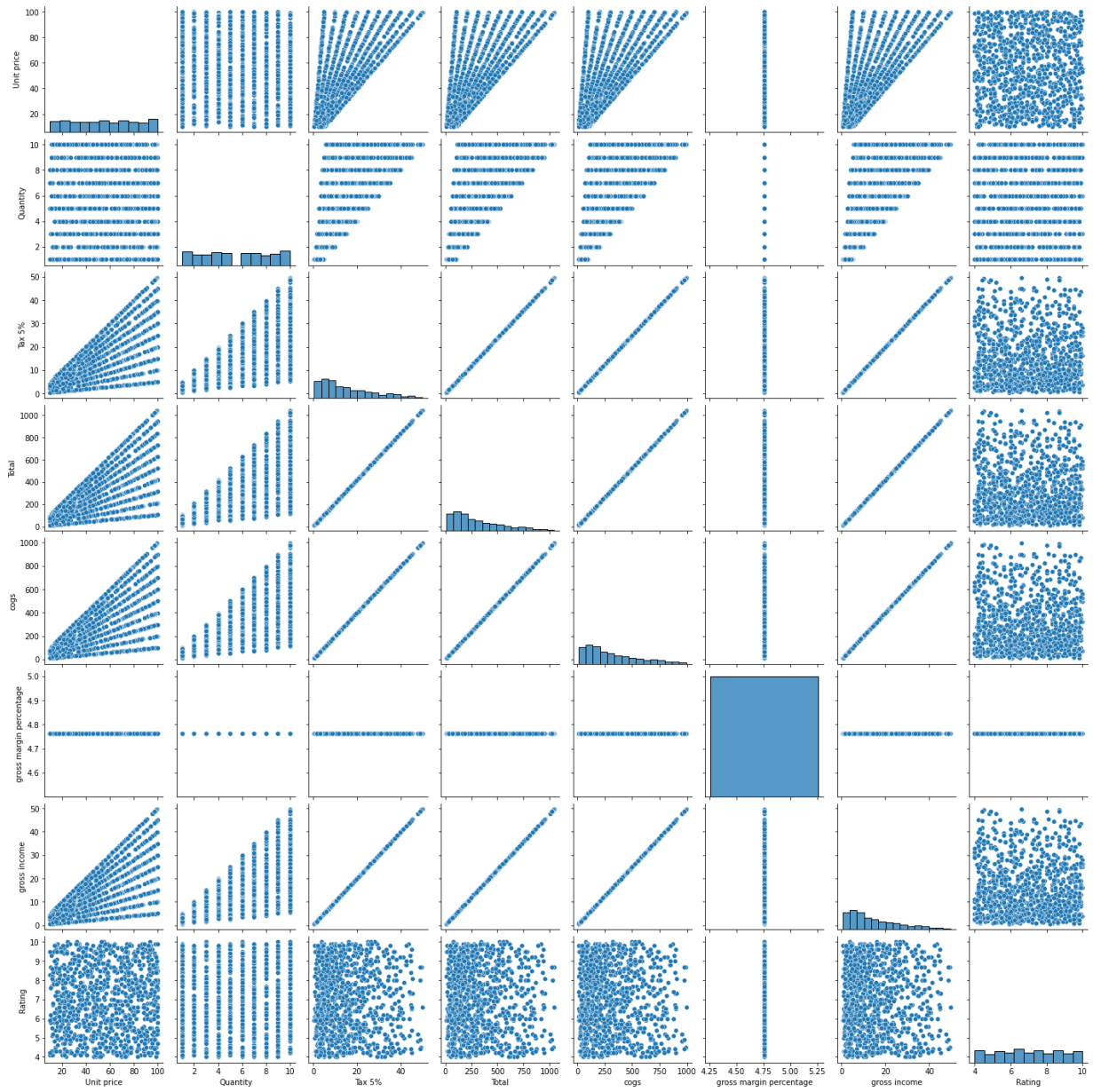
Out[23]:
```
Gender  Product line
Female  Food and beverages        33170.9175
Male    Health and beauty         30632.7525
Female  Fashion accessories       30437.4000
        Home and lifestyle        30036.8775
        Sports and travel         28574.7210
Male    Electronic accessories    27235.5090
Female  Electronic accessories    27102.0225
Male    Sports and travel         26548.1055
        Fashion accessories       23868.4950
        Home and lifestyle        23825.0355
        Food and beverages        22973.9265
Female  Health and beauty         18560.9865
Name: Total, dtype: float64
```

In [ ]:
```

```

Q14.Analyze the pairwise relationship between the numeric variables?

In [22]:
```
sns.pairplot(sales)
plt.show()
```



In [ ]: