In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from scipy import stats
```

In [2]:

```
walmart_data = pd.read_csv('walmart_data.csv')
```

In [3]:

```
walmart_data.head()
```

Out[3]:

	User_ID	Product_ID	Gender	Age	Occupation	City_Category	Stay_In_Current_City_Years	Marita
0	1000001	P00069042	F	0-17	10	A	2	
1	1000001	P00248942	F	0-17	10	A	2	
2	1000001	P00087842	F	0-17	10	A	2	
3	1000001	P00085442	F	0-17	10	A	2	
4	1000002	P00285442	M	55+	16	C	4+	

In [4]:

```
walmart_data.shape
```

Out[4]:

```
(550068, 10)
```

In [5]:

```
walmart_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 550068 entries, 0 to 550067
Data columns (total 10 columns):
 #   Column                      Non-Null Count   Dtype
---  ------                      --------------   -----
 0   User_ID                     550068 non-null  int64
 1   Product_ID                  550068 non-null  object
 2   Gender                      550068 non-null  object
 3   Age                         550068 non-null  object
 4   Occupation                  550068 non-null  int64
 5   City_Category               550068 non-null  object
 6   Stay_In_Current_City_Years  550068 non-null  object
 7   Marital_Status              550068 non-null  int64
 8   Product_Category            550068 non-null  int64
 9   Purchase                    550068 non-null  int64
dtypes: int64(5), object(5)
memory usage: 42.0+ MB
```

- There are no null values in the given data

In [6]:

```
walmart_data.describe()
```

Out[6]:

	User_ID	Occupation	Marital_Status	Product_Category	Purchase
count	5.500680e+05	550068.000000	550068.000000	550068.000000	550068.000000
mean	1.003029e+06	8.076707	0.409653	5.404270	9263.968713
std	1.727592e+03	6.522660	0.491770	3.936211	5023.065394
min	1.000001e+06	0.000000	0.000000	1.000000	12.000000
25%	1.001516e+06	2.000000	0.000000	1.000000	5823.000000
50%	1.003077e+06	7.000000	0.000000	5.000000	8047.000000
75%	1.004478e+06	14.000000	1.000000	8.000000	12054.000000
max	1.006040e+06	20.000000	1.000000	20.000000	23961.000000

In [7]:

```
walmart_data.describe(include='object')
```

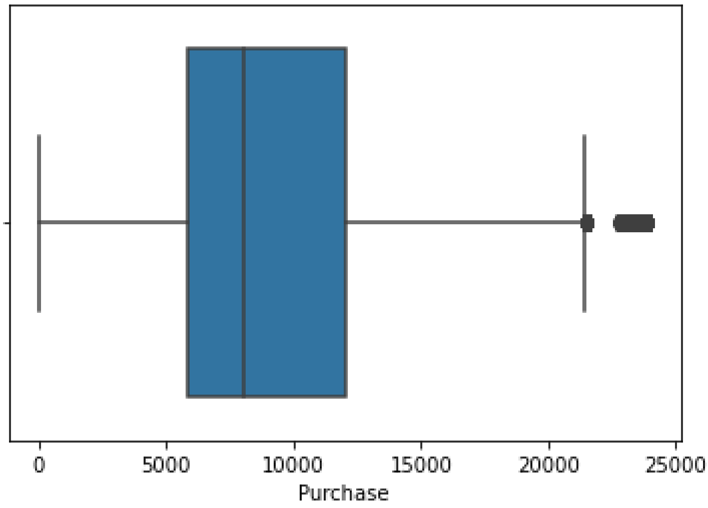
Out[7]:

	Product_ID	Gender	Age	City_Category	Stay_In_Current_City_Years
count	550068	550068	550068	550068	550068
unique	3631	2	7	3	5
top	P00265242	M	26-35	B	1
freq	1880	414259	219587	231173	193821

In [8]:

```
sns.boxplot(data=walmart_data,x='Purchase')
```

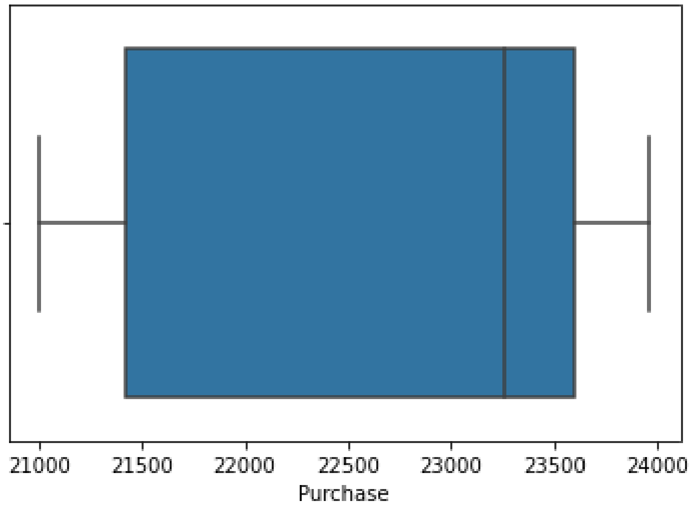
Out[8]: <AxesSubplot:xlabel='Purchase'>



In [9]:

```
sns.boxplot(data=walmart_data[walmart_data['Purchase']>21000],x='Purchase')
```

Out[9]: <AxesSubplot:xlabel='Purchase'>



- There are Products with price greater than 20000, so they are not outliers.

Lets group the data with users

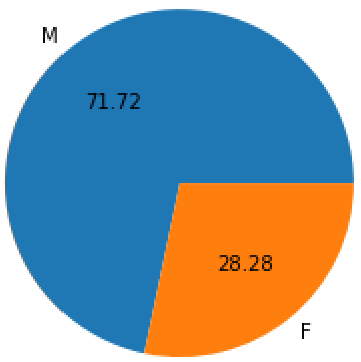
In [10]:
```
A=pd.DataFrame(walmart_data.groupby(['User_ID','Gender','Age','Occupation','City_Cat
A.rename(columns={'Purchase':'Total_Purchase'},inplace=True)

#sum of all purchases by each user
```

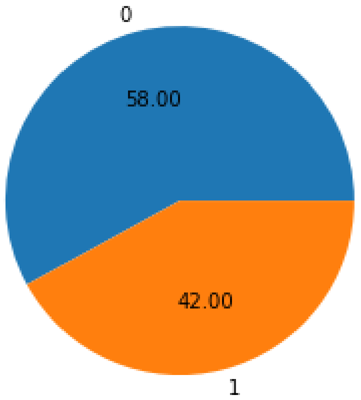
In [11]:
```
B=pd.DataFrame(walmart_data.groupby(['User_ID','Gender','Age','Occupation','City_Cat
B.rename(columns={'Product_ID':'No.of Products'},inplace=True)

#Number of products bought by each user
```

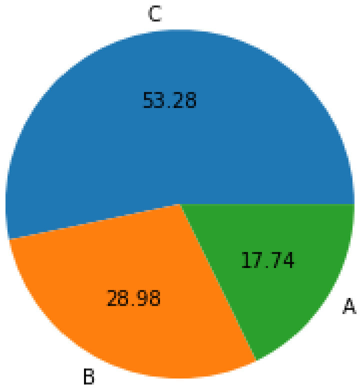
In [12]:
```
plt.pie(A['Gender'].value_counts(),autopct='%.2f',labels=A['Gender'].value_counts().
plt.show()
```



In [13]:
```
plt.pie(A['Marital_Status'].value_counts(),autopct='%.2f',labels=A['Marital_Status']
plt.show()
```

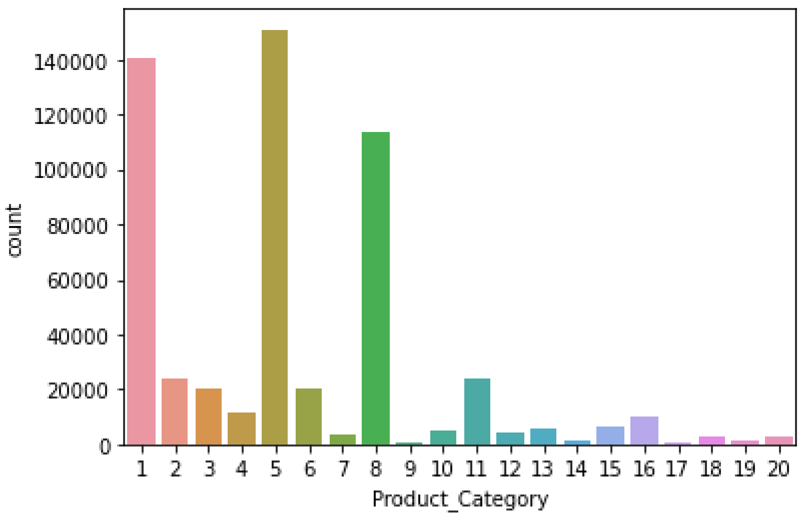


In [14]:
```
plt.pie(A['City_Category'].value_counts(),autopct='%.2f',labels=A['City_Category'].v
plt.show()
```



In [15]:
```
sns.countplot(data=walmart_data,x='Product_Category')
```

Out[15]: <AxesSubplot:xlabel='Product_Category', ylabel='count'>

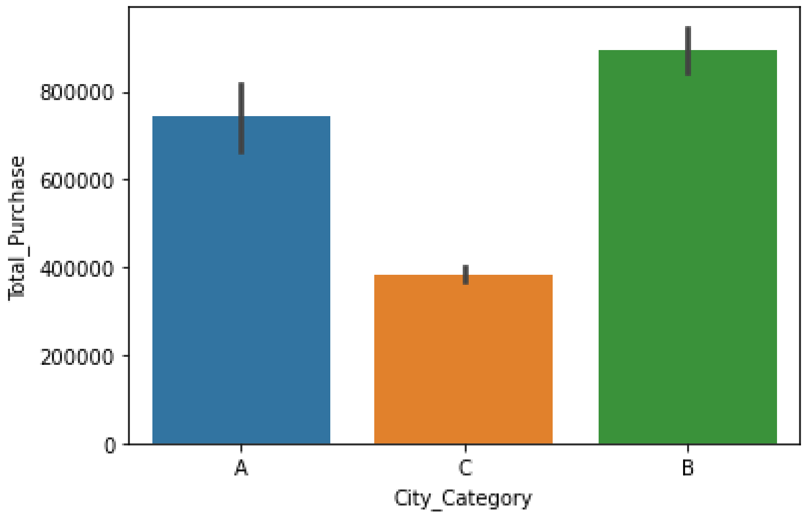


In [16]:
```
walmart_data['User_ID'].nunique()
```

Out[16]: 5891

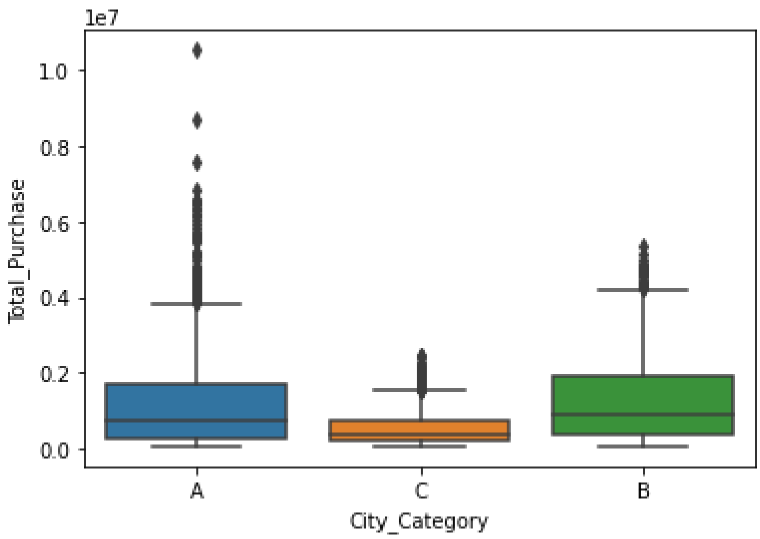
In [17]:
```
sns.barplot(data=A,x='City_Category',y='Total_Purchase',estimator=np.median)
```

Out[17]: <AxesSubplot:xlabel='City_Category', ylabel='Total_Purchase'>



In [18]:
```
sns.boxplot(data=A,x='City_Category',y='Total_Purchase')
```

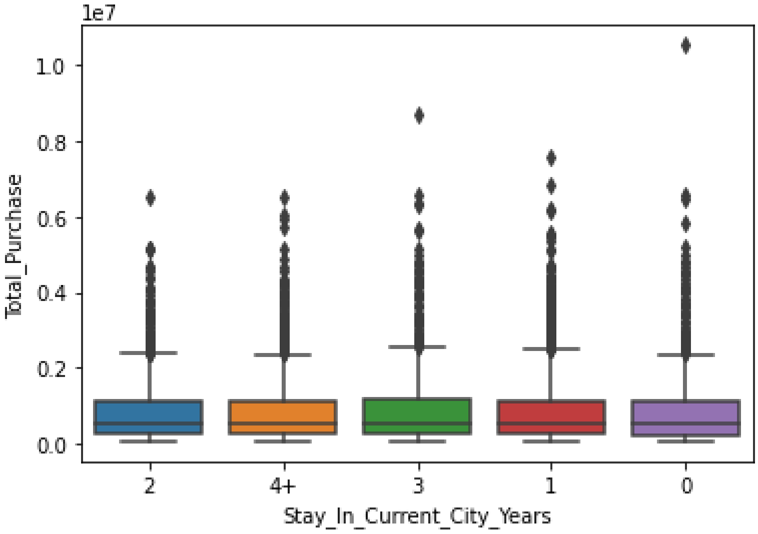
Out[18]: <AxesSubplot:xlabel='City_Category', ylabel='Total_Purchase'>



- A city is having more expenses per user than B, C cities.

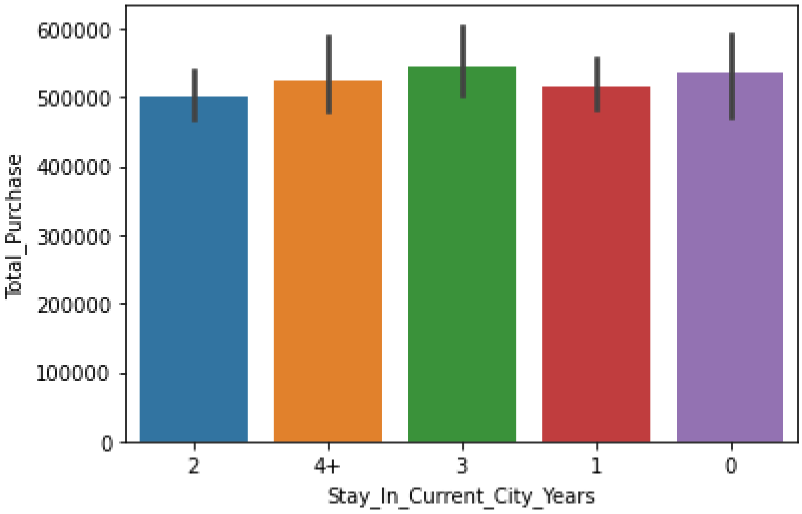
In [44]:
```
sns.boxplot(data=A,x='Stay_In_Current_City_Years',y='Total_Purchase')
```

Out[44]: <AxesSubplot:xlabel='Stay_In_Current_City_Years', ylabel='Total_Purchase'>



In [45]:
```
sns.barplot(data=A,x='Stay_In_Current_City_Years',y='Total_Purchase',estimator=np.me
```

Out[45]: <AxesSubplot:xlabel='Stay_In_Current_City_Years', ylabel='Total_Purchase'>



- There is no much difference in expenses with respect to Stay_In_Current_City_Years

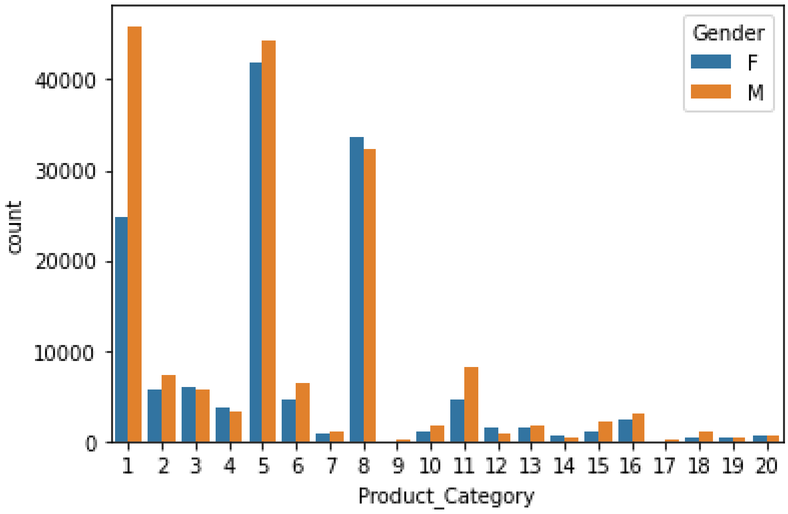
In [19]:
```
users=pd.DataFrame(walmart_data[['User_ID','Gender']].groupby(['User_ID','Gender']).
users.reset_index([0,1],inplace=True)
b=users[users['Gender']=='M'].sample(n=sum(users['Gender']=='F'))
fifty=pd.concat([users[users['Gender']=='F'],b])
```

In [20]:
```
data_gen = pd.merge(walmart_data, fifty)[walmart_data.columns]
```

- creating data with same proportion of male and female users to visualize any more probability in choosing product category with gender or marital or age

In [21]:
```
sns.countplot(data=data_gen,x='Product_Category',hue='Gender')
```

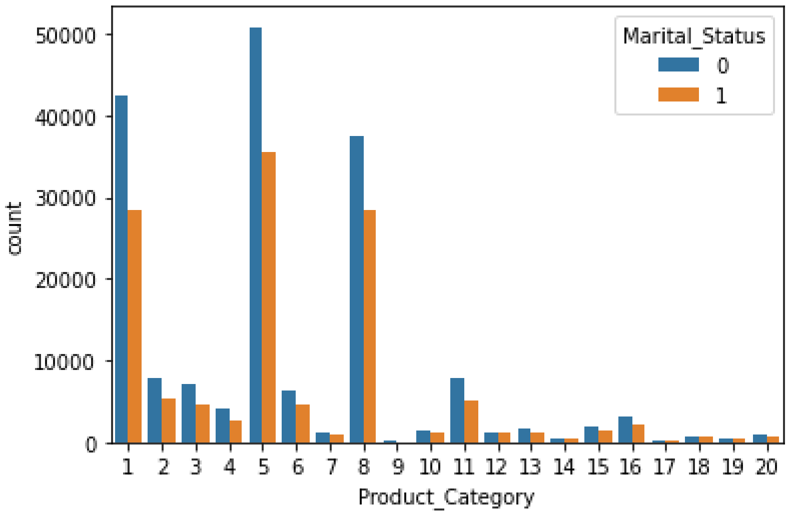
Out[21]: <AxesSubplot:xlabel='Product_Category', ylabel='count'>



- Product category 1 is purchased more by male
- product category 8 is purchased slightly more by female

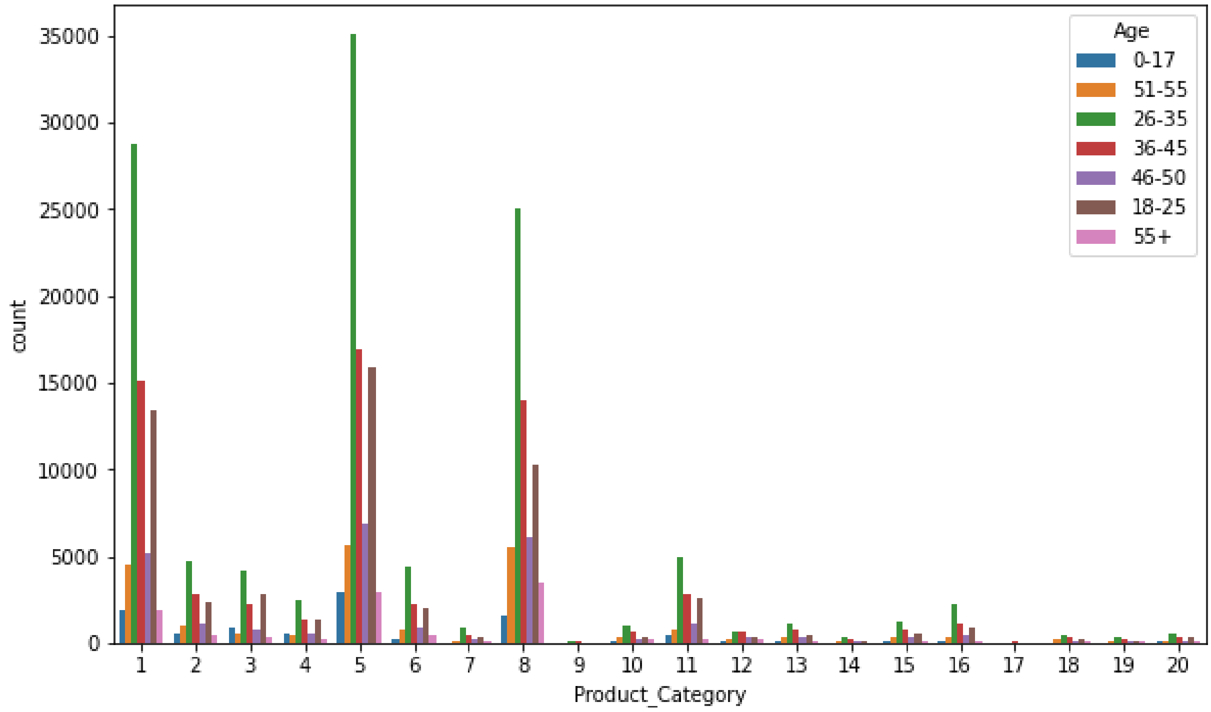
In [22]:
```
sns.countplot(data=data_gen,x='Product_Category',hue='Marital_Status')
```

Out[22]: <AxesSubplot:xlabel='Product_Category', ylabel='count'>



In [23]:
```
plt.figure(figsize=(10,6))
sns.countplot(data=data_gen,x='Product_Category',hue='Age')
```

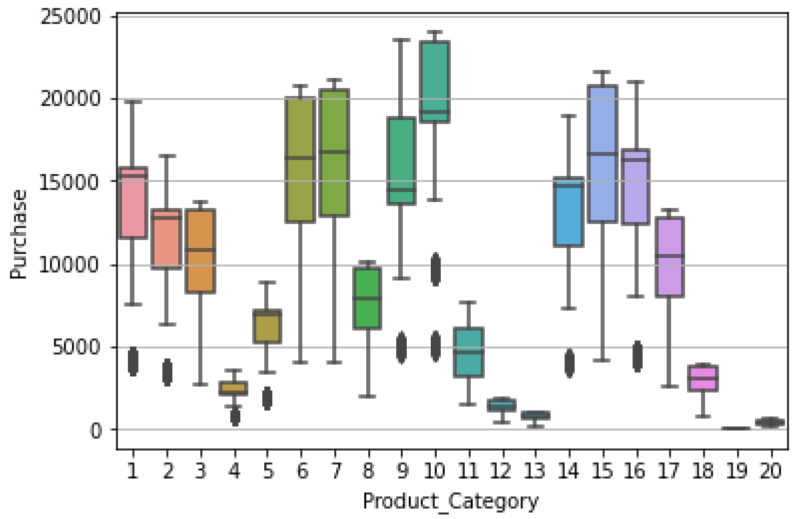
Out[23]: <AxesSubplot:xlabel='Product_Category', ylabel='count'>



- Not much difference with age to any product category

In [24]:
```
plt.grid()
sns.boxplot(data=walmart_data,x='Product_Category',y='Purchase')
```

Out[24]:
```
<AxesSubplot:xlabel='Product_Category', ylabel='Purchase'>
```



- There are reasonably many products out of the range but we cannot consider them as outliers

Confidence Interval and CLT

Male vs Female

90%

In [25]:
```
values=np.array([np.random.choice(A[A['Gender']=='M']['Total_Purchase'],size=len(A[A
print('Confidence interval of male total purchase ',np.percentile(values,[100*(1-0.9

m=values.mean()
```

```
s=values.std()
clt=[m-1.645*s,m+1.645*s]
print('Central limit of male total purchase ',clt)
```

```
Confidence interval of male total purchase  [901971.65821302 949016.9036213 ]
Central limit of male total purchase  [901119.6348061577, 949819.0269822447]
```

In [26]:

```
values=np.array([np.random.choice(A[A['Gender']=='F']['Total_Purchase'],size=len(A[A
print('Confidence interval of female total purchase ',np.percentile(values,[100*(1-0

m=values.mean()
s=values.std()
clt=[m-1.645*s,m+1.645*s]
print('Central limit of female total purchase ',clt)
```

```
Confidence interval of female total purchase  [675051.09518307 751740.14063625]
Central limit of female total purchase  [680168.6579296949, 744885.7436117217]
```

- Female mean is less than Male mean of purchase
- We can conclude that Male purchase more and there is no overlapping in intervals.

95%

In [27]:

```
values=np.array([np.random.choice(A[A['Gender']=='M']['Total_Purchase'],size=len(A[A
print('Confidence interval of male total purchase ',np.percentile(values,[100*(1-0.9

m=values.mean()
s=values.std()
clt=[m-1.96*s,m+1.96*s]
print('Central limit of male total purchase ',clt)
```

```
Confidence interval of male total purchase  [896387.67166864 956534.49822485]
Central limit of male total purchase  [895087.8274350985, 955329.176390227]
```

In [28]:

```
values=np.array([np.random.choice(A[A['Gender']=='F']['Total_Purchase'],size=len(A[A
print('Confidence interval of female total purchase ',np.percentile(values,[100*(1-0

m=values.mean()
s=values.std()
clt=[m-1.96*s,m+1.96*s]
print('Central limit of female total purchase ',clt)
```

```
Confidence interval of female total purchase  [672372.8340036  751067.24602341]
Central limit of female total purchase  [672911.3325581824, 750308.6352089247]
```

99%

In [29]:

```
values=np.array([np.random.choice(A[A['Gender']=='M']['Total_Purchase'],size=len(A[A
print('Confidence interval of male total purchase ',np.percentile(values,[100*(1-0.9

m=values.mean()
s=values.std()
clt=[m-2.576*s,m+2.576*s]
print('Central limit of male total purchase ',clt)
```

```
Confidence interval of male total purchase  [887098.98822012 962630.99757515]
Central limit of male total purchase  [887205.7452087209, 963718.0364594448]
```

In [30]:

```
values=np.array([np.random.choice(A[A['Gender']=='F']['Total_Purchase'],size=len(A[A
```

```
print('Confidence interval of female total purchase ',np.percentile(values,[100*(1-0

m=values.mean()
s=values.std()
clt=[m-2.576*s,m+2.576*s]
print('Central limit of female total purchase ',clt)
```

```
Confidence interval of female total purchase  [659392.21262305 759208.61794418]
Central limit of female total purchase  [662189.3276626193, 761714.0453397816]
```

Married vs Unmarried

90%

In [31]:

```
values=np.array([np.random.choice(A[A['Marital_Status']==0]['Total_Purchase'],size=l
print('Confidence interval of Unmarried total purchase ',np.percentile(values,[100*(

m=values.mean()
s=values.std()
clt=[m-1.645*s,m+1.645*s]
print('Central limit of Unmarried total purchase ',clt)
```

```
Confidence interval of Unmarried total purchase  [854543.49891718 908032.17038338]
Central limit of Unmarried total purchase  [854788.718739602, 907653.5823736554]
```

In [32]:

```
values=np.array([np.random.choice(A[A['Marital_Status']==1]['Total_Purchase'],size=l
print('Confidence interval of married total purchase ',np.percentile(values,[100*(1-

m=values.mean()
s=values.std()
clt=[m-1.645*s,m+1.645*s]
print('Central limit of married total purchase ',clt)
```

```
Confidence interval of married total purchase  [813422.06234842 875384.27605093]
Central limit of married total purchase  [813469.7392588297, 874642.9669165947]
```

- Unmarried users expenses are more compared to married

- There is overlapping of intervals for unmarried and married users.

95%

In [33]:

```
values=np.array([np.random.choice(A[A['Marital_Status']==0]['Total_Purchase'],size=l
print('Confidence interval of Unmarried total purchase ',np.percentile(values,[100*(

m=values.mean()
s=values.std()
clt=[m-1.96*s,m+1.96*s]
print('Central limit of Unmarried total purchase ',clt)
```

```
Confidence interval of Unmarried total purchase  [848416.44871964 911101.63833772]
Central limit of Unmarried total purchase  [849021.2371542691, 912450.3895159094]
```

In [34]:

```
values=np.array([np.random.choice(A[A['Marital_Status']==1]['Total_Purchase'],size=l
print('Confidence interval of married total purchase ',np.percentile(values,[100*(1-

m=values.mean()
s=values.std()
clt=[m-1.96*s,m+1.96*s]
print('Central limit of married total purchase ',clt)
```

```
Confidence interval of married total purchase  [807007.03719685 881073.00994341]
Central limit of married total purchase  [805997.9056611797, 879305.5689273409]
```

99%

In [35]:

```
values=np.array([np.random.choice(A[A['Marital_Status']==0]['Total_Purchase'],size=l
print('Confidence interval of Unmarried total purchase ',np.percentile(values,[100*(

m=values.mean()
s=values.std()
clt=[m-2.576*s,m+2.576*s]
print('Central limit of Unmarried total purchase ',clt)
```

```
Confidence interval of Unmarried total purchase  [841451.19091601 922998.19936348]
Central limit of Unmarried total purchase  [838551.3232096685, 921932.8335102613]
```

In [36]:

```
values=np.array([np.random.choice(A[A['Marital_Status']==1]['Total_Purchase'],size=l
print('Confidence interval of married total purchase ',np.percentile(values,[100*(1-

m=values.mean()
s=values.std()
clt=[m-2.576*s,m+2.576*s]
print('Central limit of married total purchase ',clt)
```

```
Confidence interval of married total purchase  [795488.62008286 893993.22547494]
Central limit of married total purchase  [795031.2430336766, 892189.4927310767]
```

By Age

In [37]:

```
values=np.array([np.random.choice(A[A['Age']=='0-17']['Total_Purchase'],size=len(A[A
print('Confidence interval of Age 0-17 total purchase ',np.percentile(values,[100*(1

m=values.mean()
s=values.std()
clt=[m-1.96*s,m+1.96*s]
print('Central limit of Age 0-17 total purchase ',clt)
```

```
Confidence interval of Age 0-17 total purchase  [536917.56169725 716724.15642202]
Central limit of Age 0-17 total purchase  [529123.5966098601, 711014.7243442681]
```

In [38]:

```
values=np.array([np.random.choice(A[A['Age']=='18-25']['Total_Purchase'],size=len(A[
print('Confidence interval of Age 18-25 total purchase ',np.percentile(values,[100*(

m=values.mean()
s=values.std()
clt=[m-1.96*s,m+1.96*s]
print('Central limit of Age 18-25 total purchase ',clt)
```

```
Confidence interval of Age 18-25 total purchase  [804788.5666043 907333.8695276]
Central limit of Age 18-25 total purchase  [803875.2920436998, 908250.2889441395]
```

In [39]:

```
values=np.array([np.random.choice(A[A['Age']=='26-35']['Total_Purchase'],size=len(A[
print('Confidence interval of Age 26-35 total purchase ',np.percentile(values,[100*(

m=values.mean()
s=values.std()
clt=[m-1.96*s,m+1.96*s]
print('Central limit of Age 26-35 total purchase ',clt)
```

```
Confidence interval of Age 26-35 total purchase  [ 947618.1325621  1036206.60071846]
```

```
Central limit of Age 26-35 total purchase  [945528.2721505108, 1034887.7048158798]
```

In [40]:

```
values=np.array([np.random.choice(A[A['Age']=='36-45']['Total_Purchase'],size=len(A[
print('Confidence interval of Age 36-45 total purchase ',np.percentile(values,[100*(

m=values.mean()
s=values.std()
clt=[m-1.96*s,m+1.96*s]
print('Central limit of Age 36-45 total purchase ',clt)
```

```
Confidence interval of Age 36-45 total purchase  [822213.19558698 937598.21343188]
Central limit of Age 36-45 total purchase  [824582.5476063185, 936300.7636636042]
```

In [41]:

```
values=np.array([np.random.choice(A[A['Age']=='46-50']['Total_Purchase'],size=len(A[
print('Confidence interval of Age 46-50 total purchase ',np.percentile(values,[100*(

m=values.mean()
s=values.std()
clt=[m-1.96*s,m+1.96*s]
print('Central limit of Age 46-50 total purchase ',clt)
```

```
Confidence interval of Age 46-50 total purchase  [716578.31694915 870797.97721281]
Central limit of Age 46-50 total purchase  [713448.9574009744, 867404.0395971427]
```

In [42]:

```
values=np.array([np.random.choice(A[A['Age']=='51-55']['Total_Purchase'],size=len(A[
print('Confidence interval of Age 51-55 total purchase ',np.percentile(values,[100*(

m=values.mean()
s=values.std()
clt=[m-1.96*s,m+1.96*s]
print('Central limit of Age 51-55 total purchase ',clt)
```

```
Confidence interval of Age 51-55 total purchase  [695591.41055094 830980.4799896 ]
Central limit of Age 51-55 total purchase  [694156.3716591604, 830098.1103574717]
```

In [43]:

```
values=np.array([np.random.choice(A[A['Age']=='55+']['Total_Purchase'],size=len(A[A[
print('Confidence interval of Age 55+ total purchase ',np.percentile(values,[100*(1-

m=values.mean()
s=values.std()
clt=[m-1.96*s,m+1.96*s]
print('Central limit of Age 55+ total purchase ',clt)
```

```
Confidence interval of Age 55+ total purchase  [474964.77137097 598878.52573925]
Central limit of Age 55+ total purchase  [477040.0236867421, 603165.2496358384]
```

- Highest mean of expenses of users in Age 26-35.

In [ ]: