Walmart : Confidence Interval and CLT:

In [1]:
```
# Importing th required Libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from scipy.stats import norm,binom,gennorm,expon
```

In [2]:
```
#Loading the dataset

data = pd.read_csv("walmart_data.csv")
```

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

Out[3]:

	User_ID	Product_ID	Gender	Age	Occupation	City_Category	Stay_In_Current_City_Years	Mari
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]:
```
data.shape
```

Out[4]:
```
(550068, 10)
```

In [5]:
```
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
```

In [6]:
```
data.dtypes
```

Out[6]:

	0
User_ID	int64
Product_ID	object
Gender	object
Age	object
Occupation	int64
City_Category	object
Stay_In_Current_City_Years	object
Marital_Status	int64
Product_Category	int64
Purchase	int64

dtype: object

In [7]:
```
data.isna().sum()
```

Out[7]:

	0
User_ID	0
Product_ID	0
Gender	0
Age	0
Occupation	0
City_Category	0
Stay_In_Current_City_Years	0
Marital_Status	0
Product_Category	0
Purchase	0

dtype: int64

In [8]:
```
data.nunique()
```

Out[8]:

	0
User_ID	5891
Product_ID	3631
Gender	2
Age	7
Occupation	21
City_Category	3
Stay_In_Current_City_Years	5
Marital_Status	2
Product_Category	20
Purchase	18105

dtype: int64

In [9]:
```
data["User_ID"].value_counts()
```

Out[9]:

User_ID	count
1001680	1026
1004277	979
1001941	898
1001181	862
1000889	823
...	...
1002690	7
1002111	7
1005810	7
1004991	7
1000708	6

5891 rows × 1 columns

dtype: int64

In [10]:
```
data["Product_ID"].value_counts()
```

Out[10]:

	count
Product_ID	
P00265242	1880
P00025442	1615
P00110742	1612
P00112142	1562
P00057642	1470
...	...
P00314842	1
P00298842	1
P00231642	1
P00204442	1
P00066342	1

3631 rows × 1 columns

dtype: int64

In [11]:
```
data["Gender"].value_counts()
```

Out[11]:

	count
Gender	
M	414259
F	135809

dtype: int64

In [12]:
```
data["Age"].value_counts()
```

Out[12]:

	count
Age	
26-35	219587
36-45	110013
18-25	99660
46-50	45701
51-55	38501
55+	21504
0-17	15102

dtype: int64

In [13]:
```
data["Occupation"].value_counts()
```

Out[13]:

Occupation	count
4	72308
0	69638
7	59133
1	47426
17	40043
20	33562
12	31179
14	27309
2	26588
16	25371
6	20355
3	17650
10	12930
5	12177
15	12165
11	11586
19	8461
13	7728
18	6622
9	6291
8	1546

dtype: int64

In [14]:
```
data["City_Category"].value_counts()
```

Out[14]:

City_Category	count
B	231173
C	171175
A	147720

dtype: int64

In [15]:
```
data["Stay_In_Current_City_Years"].value_counts()
```

Out[15]:

Stay_In_Current_City_Years	count
1	193821
2	101838
3	95285
4+	84726
0	74398

dtype: int64

In [16]:
```
data["Marital_Status"].value_counts()
```

Out[16]:

Marital_Status	count
0	324731
1	225337

dtype: int64

In [17]:
```
data["Product_Category"].value_counts()
```

Out[17]:

Product_Category	count
5	150933
1	140378
8	113925
11	24287
2	23864
6	20466
3	20213
4	11753
16	9828
15	6290
13	5549
10	5125
12	3947
7	3721
18	3125
20	2550
19	1603
14	1523
17	578
9	410

dtype: int64

In [18]:
```
data["Purchase"].value_counts()
```

Out[18]:

Purchase	count
7011	191
7193	188
6855	187
6891	184
7012	183
...	...
23491	1
18345	1
3372	1
855	1
21489	1

18105 rows × 1 columns

dtype: int64

In [19]:

```
data.describe()
```

Out[19]:

	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 [20]:

```
#Creating a correlation table

data_cpy = data[["User_ID","Gender","Age","Occupation","City_Category","Stay_In_Cur
data_cpy["Gender"].replace(['M', 'F'], [1, 0], inplace=True)
data_cpy["City_Category"].replace(['A', 'B','C'], [1, 2,3], inplace=True)
data_cpy["Age"].replace(["0-17","18-25","26-35","36-45","46-50","51-55","55+"],[1,2
data_cpy["Stay_In_Current_City_Years"].replace(["4+"],[4],inplace=True)

data_cpy.corr()
```

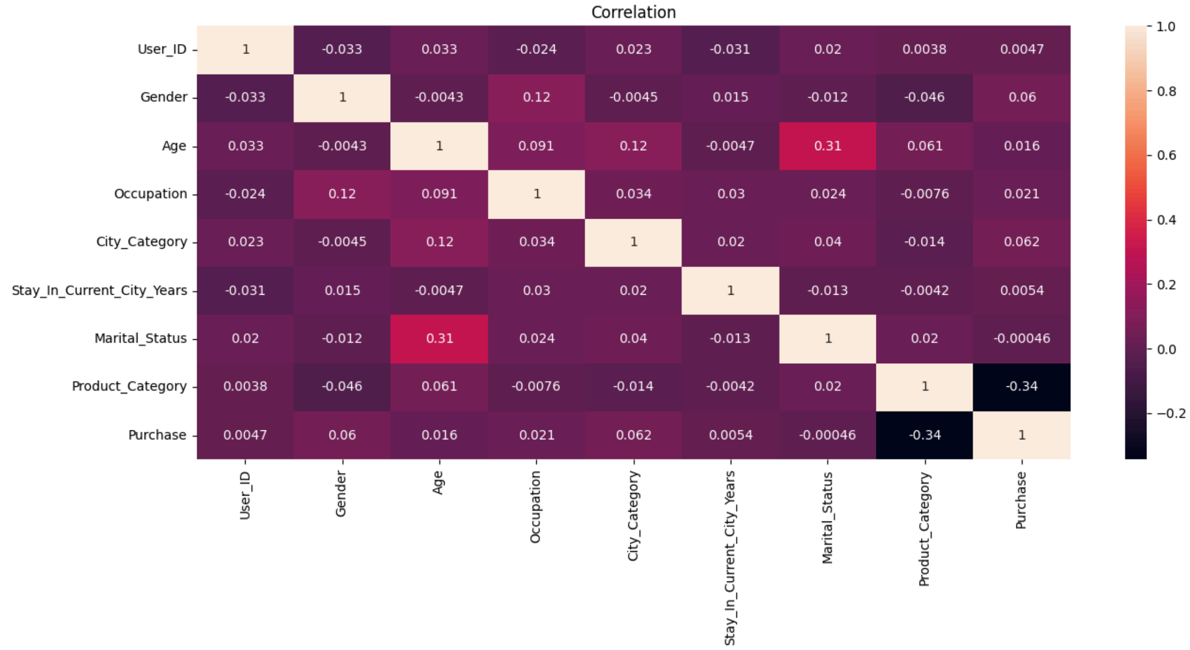
```
<ipython-input-20-f785264269ce>:4: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stabl
e/user_guide/indexing.html#returning-a-view-versus-a-copy
  data_cpy["Gender"].replace(['M', 'F'], [1, 0], inplace=True)
<ipython-input-20-f785264269ce>:5: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stabl
e/user_guide/indexing.html#returning-a-view-versus-a-copy
  data_cpy["City_Category"].replace(['A', 'B','C'], [1, 2,3], inplace=True)
<ipython-input-20-f785264269ce>:6: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stabl
e/user_guide/indexing.html#returning-a-view-versus-a-copy
  data_cpy["Age"].replace(["0-17","18-25","26-35","36-45","46-50","51-55","55+"],
[1,2,3,4,5,6,7], inplace=True)
<ipython-input-20-f785264269ce>:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stabl
e/user_guide/indexing.html#returning-a-view-versus-a-copy
  data_cpy["Stay_In_Current_City_Years"].replace(["4+"],[4],inplace=True)
```

Out[20]:

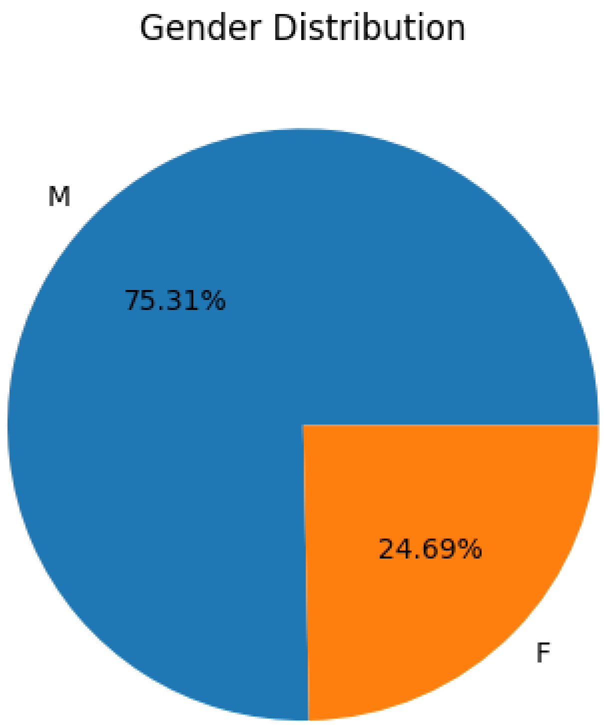
	User_ID	Gender	Age	Occupation	City_Category	Stay_In_Curr
User_ID	1.000000	-0.033474	0.032698	-0.023971	0.022859	
Gender	-0.033474	1.000000	-0.004262	0.117291	-0.004515	
Age	0.032698	-0.004262	1.000000	0.091463	0.123079	
Occupation	-0.023971	0.117291	0.091463	1.000000	0.034479	
City_Category	0.022859	-0.004515	0.123079	0.034479	1.000000	
Stay_In_Current_City_Years	-0.030737	0.014660	-0.004712	0.030005	0.019946	
Marital_Status	0.020443	-0.011603	0.311738	0.024280	0.039790	
Product_Category	0.003825	-0.045594	0.061197	-0.007618	-0.014364	
Purchase	0.004716	0.060346	0.015839	0.020833	0.061914	

In [21]:

```
#Creating a Heat Map to analyse the correlation between each variable

plt.figure(figsize=(15,6))

sns.heatmap(data_cpy.corr(), annot=True)
plt.title("Correlation")

plt.show()
```



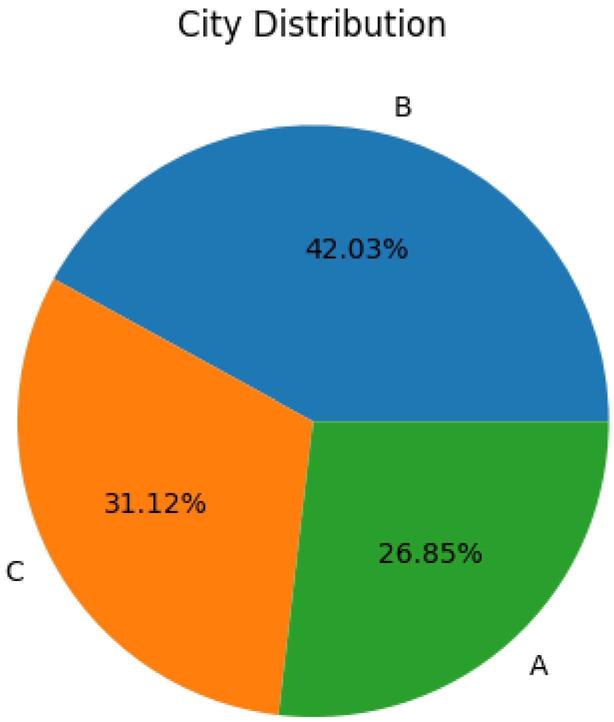
In [22]:
```
plt.pie(data["Gender"].value_counts().values , labels= data["Gender"].value_counts(
plt.title("Gender Distribution")

plt.show()
```



Insight :

- The pie chart indicates that most of the customers of the Black Friday sale are Male with 75.31% whereas female customers are 24.69%.

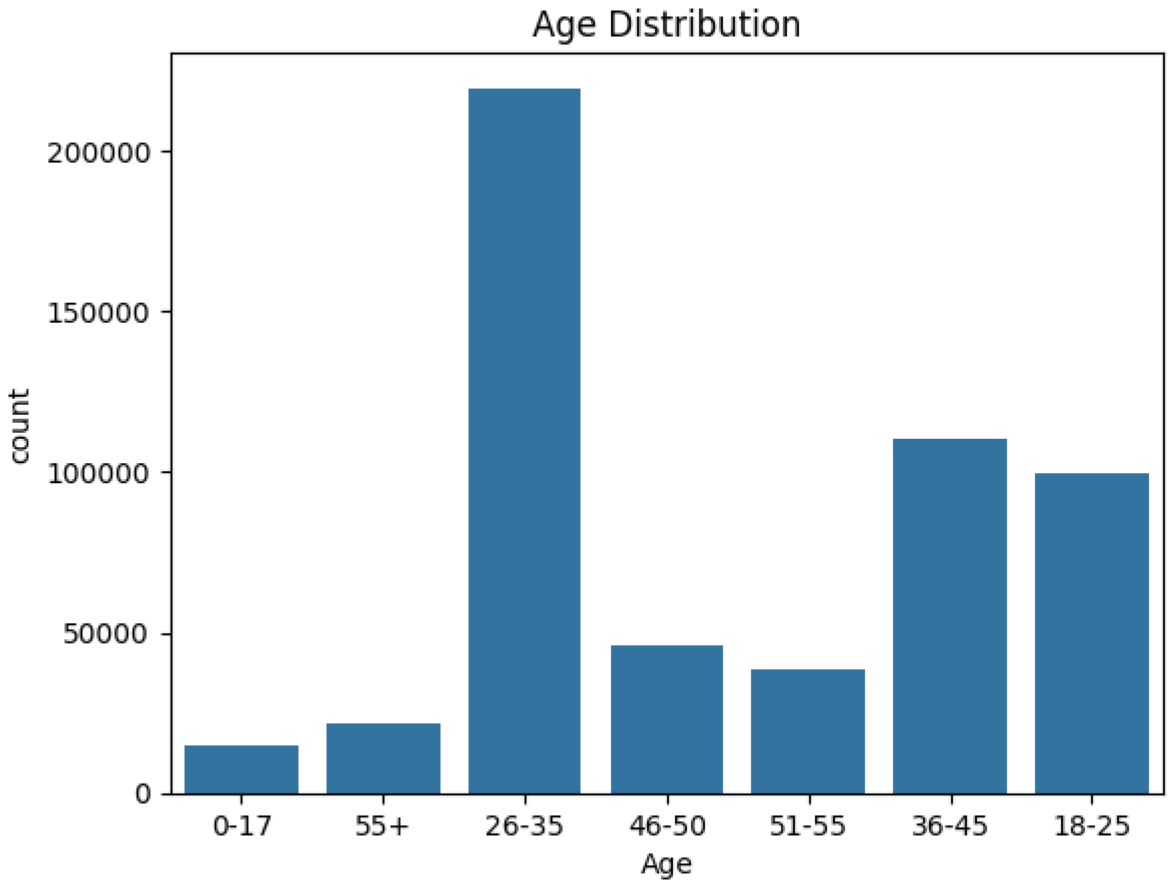
In [23]:
```
plt.pie(data["City_Category"].value_counts().values , labels= data["City_Category"]
plt.title("City Distribution")

plt.show()
```



Insight :

- Most of the customers are from the city B followed by city C and A with very minimal difference.

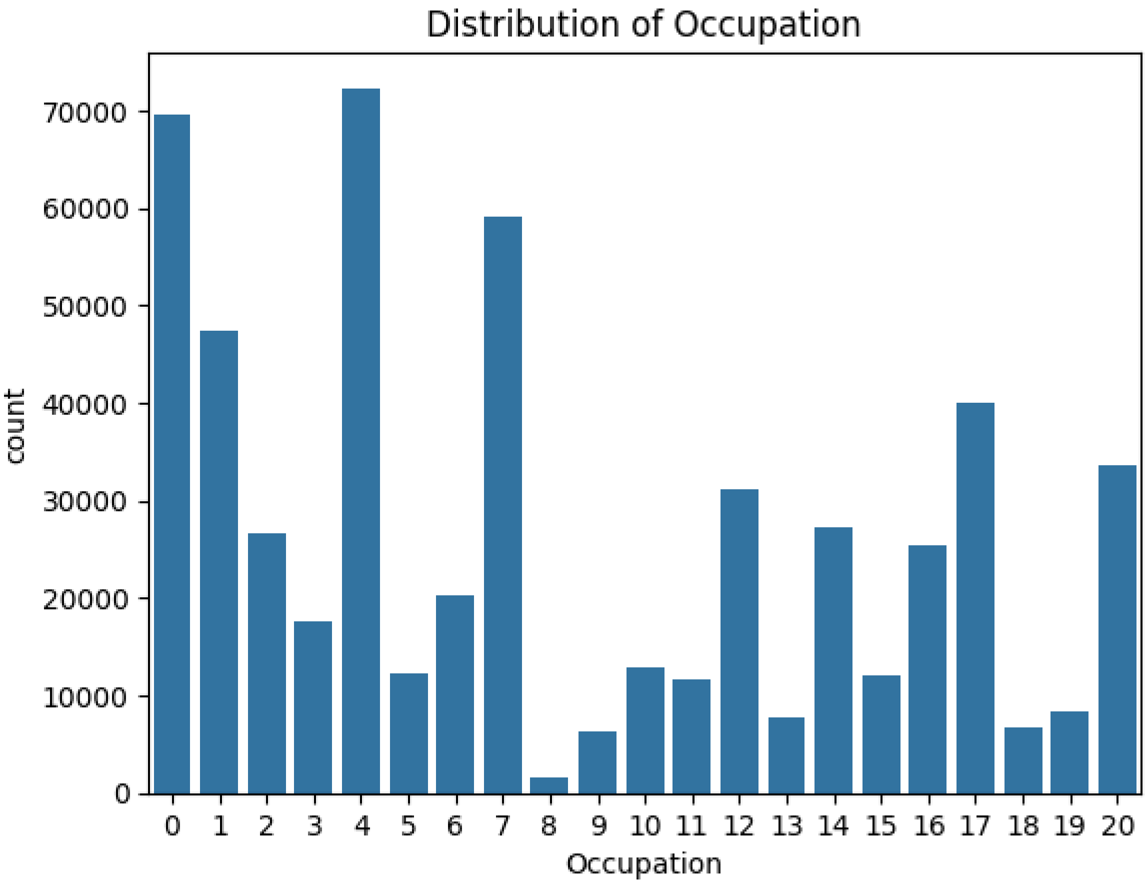
In [24]:
```
sns.countplot(x = data["Age"])
plt.title("Age Distribution")

plt.show()
```



Insight :

- Most of the customers are in the afe range 26 - 35 followed by 36 - 45 and 18 - 25.
- This implies that Walmart has customers of almost all age group.

In [25]:
```
sns.countplot(x = data["Occupation"])
plt.title("Distribution of Occupation")

plt.show()
```



Insight :

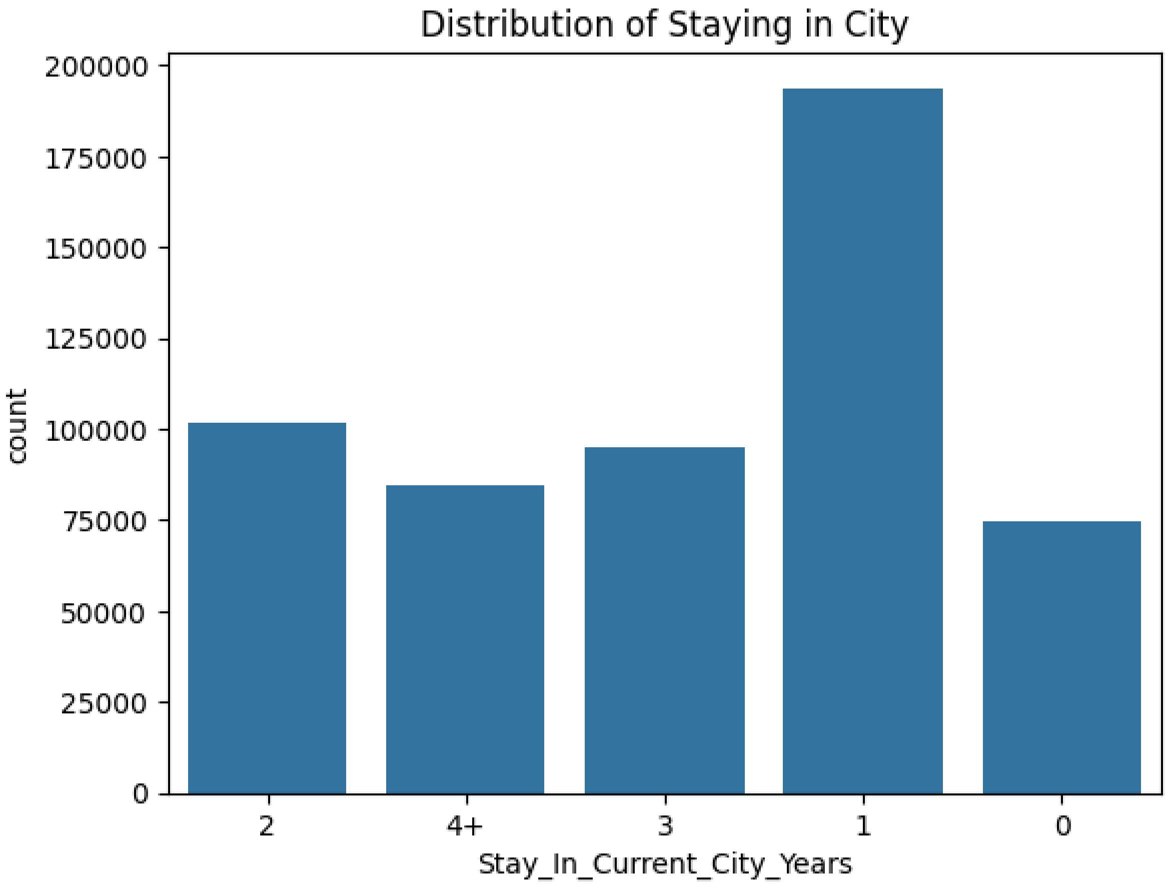
- The above graph specifies that Walmart attracts customers from wide range of occupation category.
- As per Black Friday Sale most of the customers are of category 4.

In [26]:
```
top_occ = data["Occupation"].value_counts()[:10]
sns.barplot(x = top_occ.index , y = top_occ.values )
plt.title("Top 10 Occupation")

plt.show()
```

Insight :

- The above graph shows the top 10 occupation of the customers who bought from the Black Friday Sale.
- Customers from occupation 4 , 0 and 7 have a high need of products from walmart.

In [27]:
```
sns.countplot(x = data["Stay_In_Current_City_Years"])
plt.title("Distribution of Staying in City")

plt.show()
```

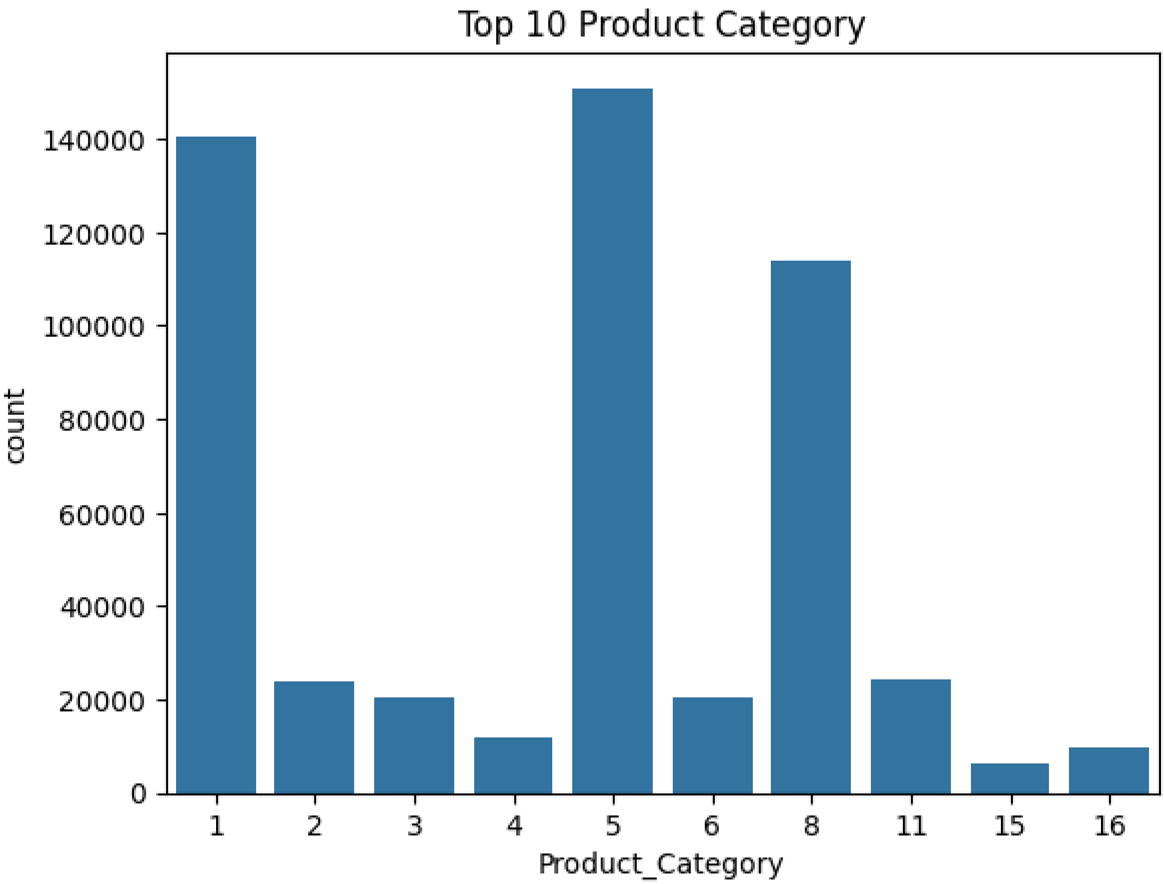


Insight :

- Most of the customers are new to the area where they are staying for 1 year, hence Walmart attracts the new customers more.

In [28]:

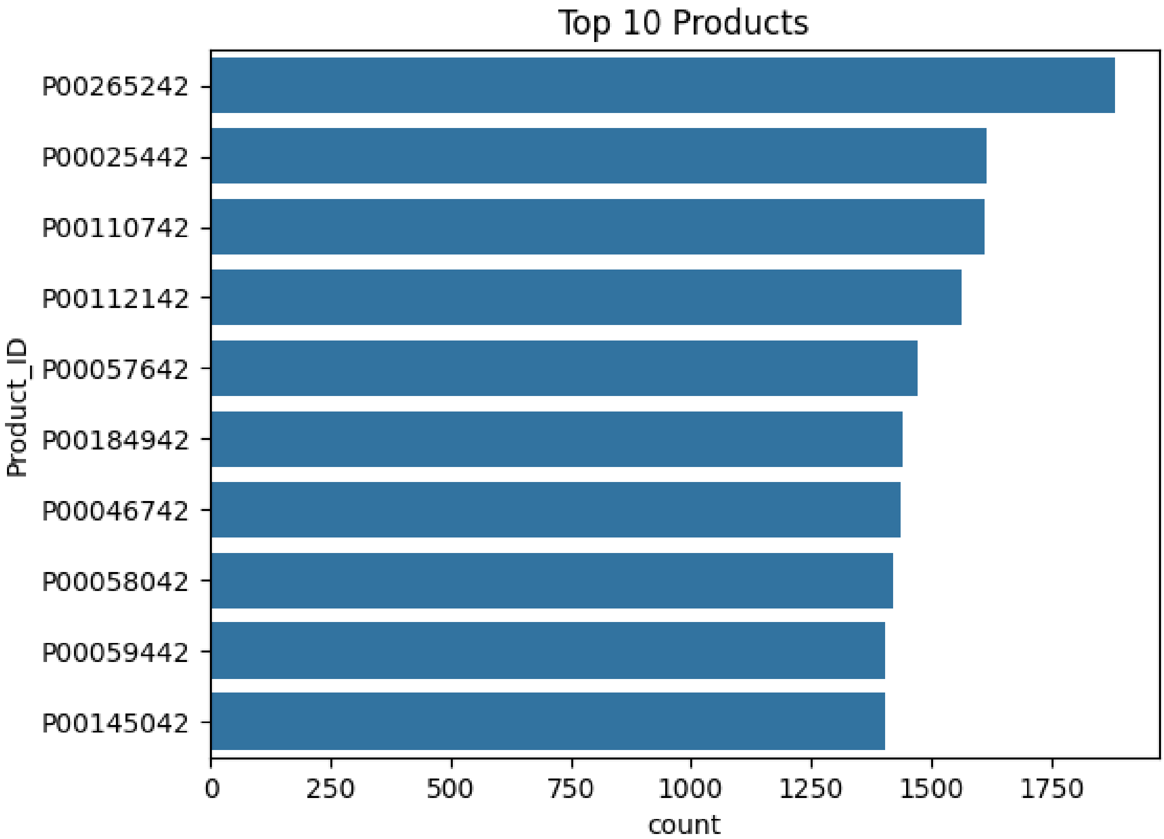
```
top_product_cat = data["Product_Category"].value_counts()[:10]
sns.barplot(x = top_product_cat.index , y = top_product_cat)
plt.title("Top 10 Product Category")

plt.show()
```



Insight :

- Product Categories 5 , 1 and 8 had a very high sale and demand in the Black friday sale whereas the remaing categories were sold comparitively very less.

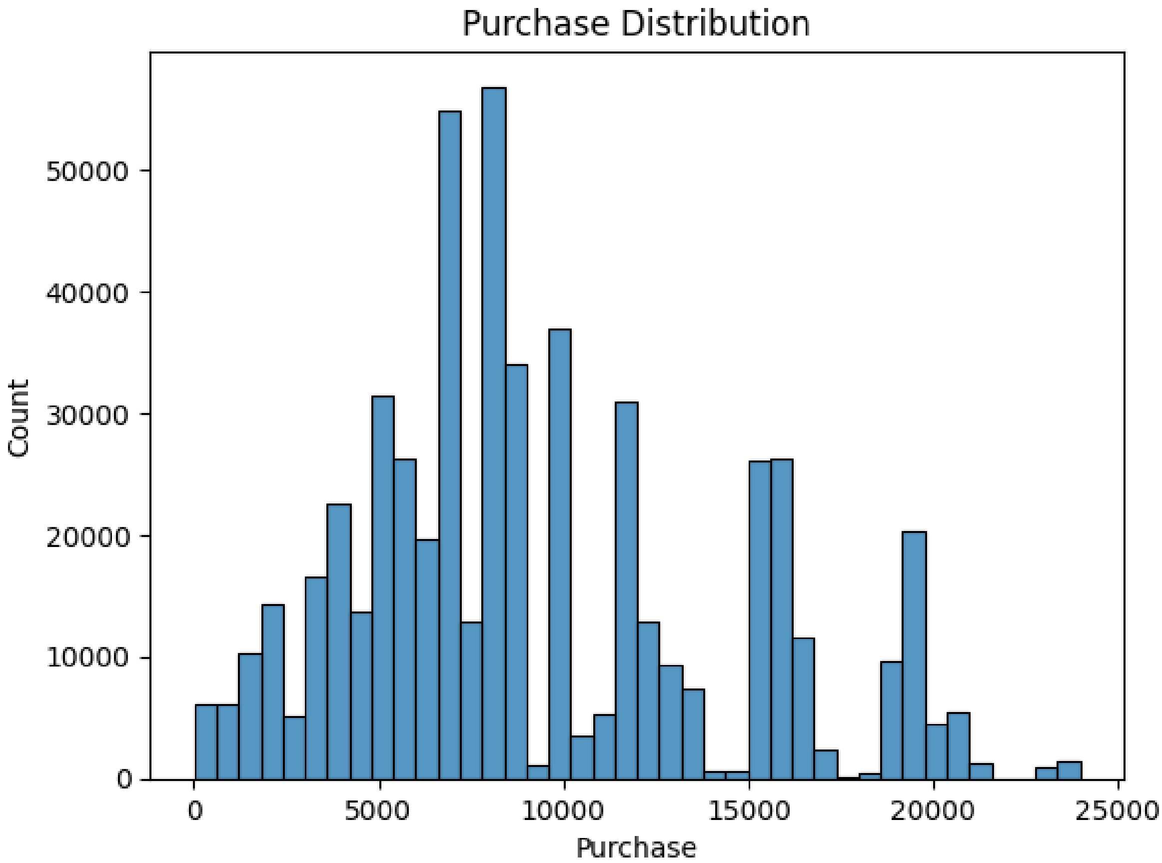
In [29]:
```
top_product_id = data["Product_ID"].value_counts()[:10]
sns.barplot(y = top_product_id.index , x = top_product_id )
plt.title("Top 10 Products")

plt.show()
```



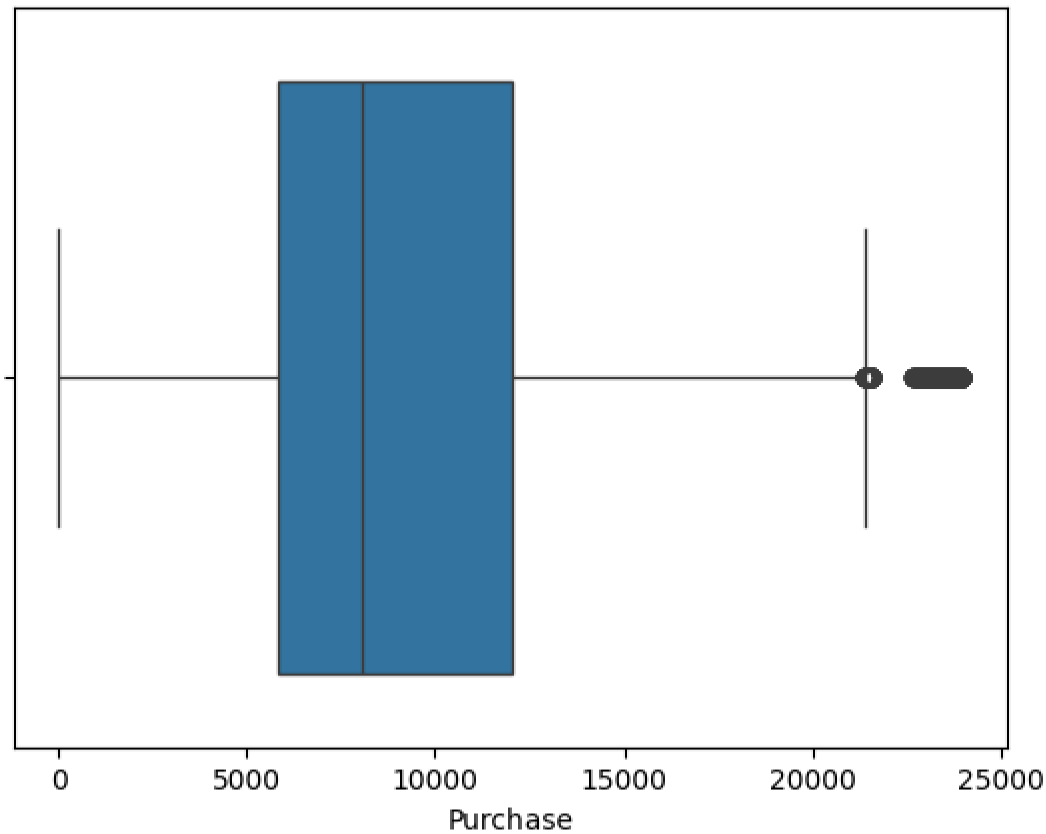
Insight :

- All the Top 10 products got sold almost equally with a very less difference.
- However Product P00265242 is the most sold product.

In [30]:
```
sns.histplot(x = "Purchase" , data = data , bins = 40)
plt.title("Purchase Distribution")

plt.show()
```



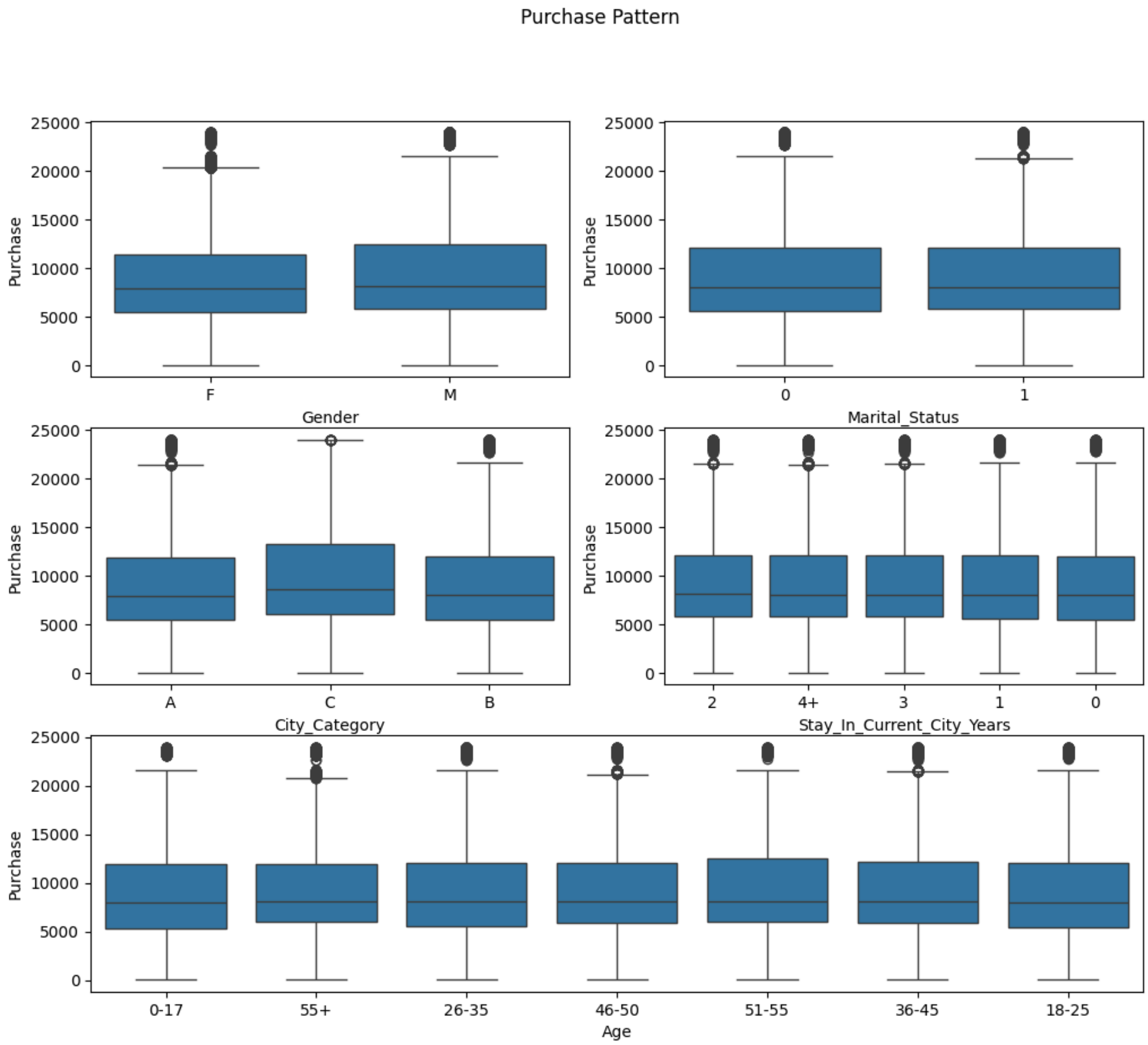
In [31]:
```
sns.boxplot(x = data["Purchase"])

plt.show()
```



Insight :

- The above box plot specifies that the mean value for all the purchases made during the Black Friday sale is around 9000 with some outliers.

In [32]:
```
plt.figure(figsize = (12,10)).suptitle("Purchase Pattern")

plt.subplot(3,2,1)
sns.boxplot(x = "Gender" , y = "Purchase" , data = data)

plt.subplot(3,2,2)
sns.boxplot(x = "Marital_Status" , y = "Purchase" , data = data)

plt.subplot(3,2,3)
sns.boxplot(x = "City_Category" , y = "Purchase" , data = data)

plt.subplot(3,2,4)
sns.boxplot(x = "Stay_In_Current_City_Years" , y = "Purchase" , data = data)

plt.subplot(3,1,3)
sns.boxplot(x = "Age" , y = "Purchase" , data = data)

plt.show()
```

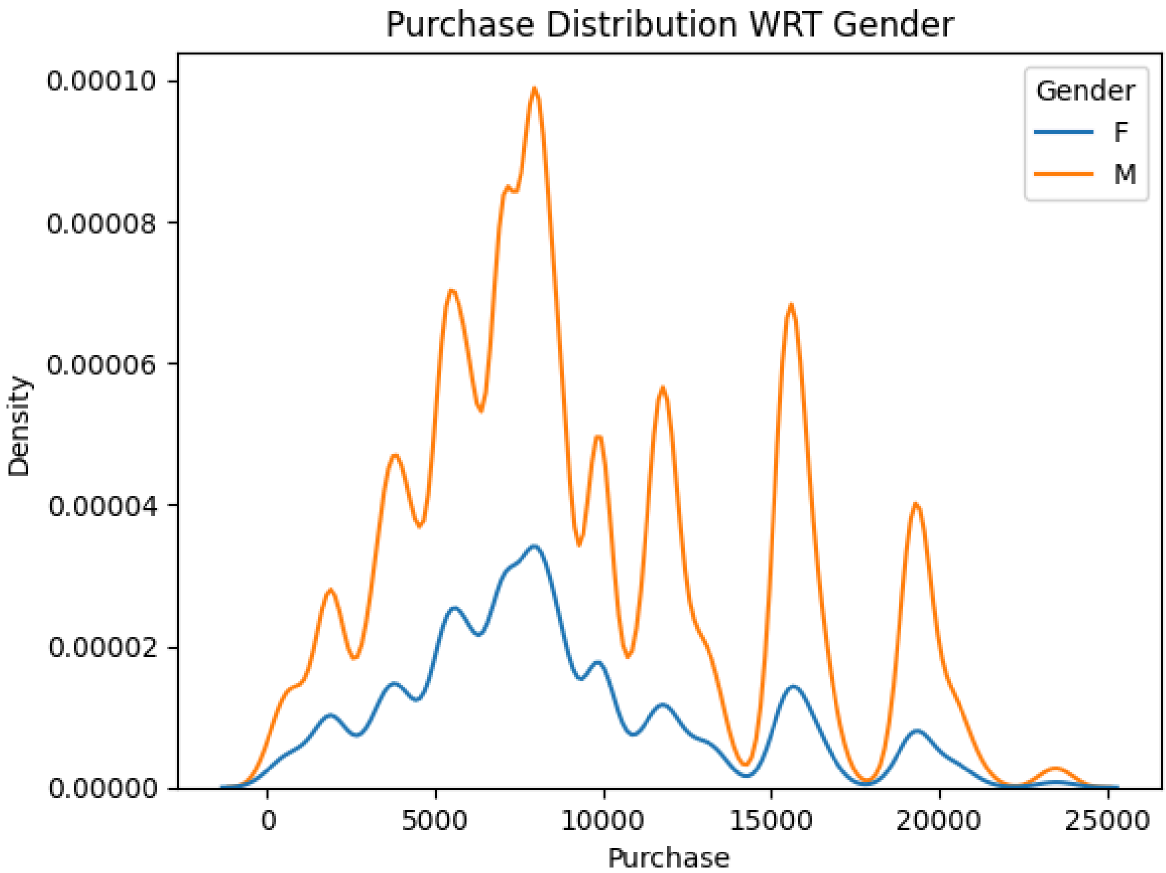


Insight :

- By observing the Purchase pattern between Gender , Marital Status, City Category , City stayed in and Age it is very clear that the Purchase mean almost stays the same in all category which is almost around 8000 to 9000.

Gender Vs Purchase Amount:

In [33]:
```
sns.kdeplot(x = "Purchase" , hue="Gender" , data = data)
plt.title("Purchase Distribution WRT Gender")

plt.show()
```



In [88]:
```
var = data . groupby("Gender")["Purchase"].agg(["sum","count"]).reset_index()
var["Gender"] = var["Gender"].replace({"F" : "Female" , "M" : "Male"})
var["Amt_Per_Purchase"] = round(var["sum"]/var["count"] , 2)
var
```

Out[88]:

	Gender	sum	count	Amt_Per_Purchase
0	Female	1186232642	135809	8734.57
1	Male	3909580100	414259	9437.53

Insight :

- The total amount spend by Male is almost 3 times greater than the amount spent by Female.
- From the above table we can see that the average amount spend per purchase by Male is higher than Female.

In [35]:
```
dt_male = data.loc[data["Gender"]=="M", "Purchase"]
dt_female = data.loc[data["Gender"]=="F" , "Purchase"]
```

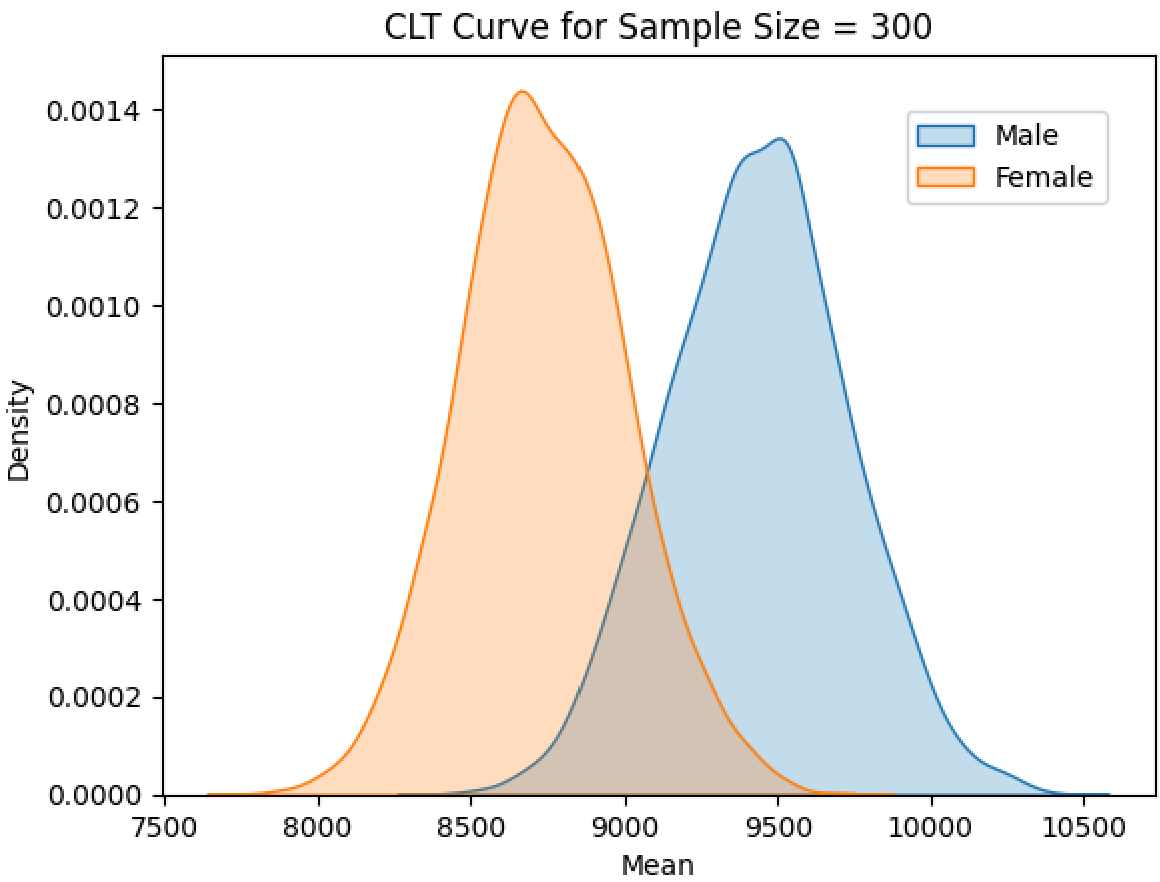
Sample Size = 300

In [36]:
```
sample_size = 300

male_mean = []
female_mean = []

for i in range(5000):
  male_sample = np.random.choice(dt_male , sample_size)
  female_sample = np.random.choice(dt_female , sample_size)

  m_mean = np.mean(male_sample)
  f_mean = np.mean(female_sample)

  male_mean.append(m_mean)
  female_mean.append(f_mean)

df_90_300 = pd.DataFrame({"male_mean" : male_mean , "female_mean" : female_mean})
df_90_300.head()
```

Out[36]:

	male_mean	female_mean
0	9152.716667	8688.703333
1	9177.023333	8463.496667
2	9485.363333	8462.143333
3	9408.843333	9256.340000
4	8938.193333	8974.526667

In [37]:
```
sns.kdeplot(x = df_90_300["male_mean"], fill = True , label = "Male")
sns.kdeplot(x = df_90_300["female_mean"], fill = True , label = "Female")
plt.legend(loc=(0.75,0.8))

plt.xlabel("Mean")
plt.title("CLT Curve for Sample Size = 300")

plt.show()
```



Confidence Interval for 90%

In [38]:
```
percent = 90
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_male = np.percentile(male_mean , [left_interval,right_interval]).round(0)
interval_female = np.percentile(female_mean , [left_interval,right_interval]).round

print(f"90% Confidence Interval for  Male with Sample Size 300 is [{interval_male[0
print(f"Range = {interval_male[1] - interval_male[0]}")
print()
print(f"90% Confidence Interval for  Female with Sample Size 300 is [{interval_fema
print(f"Range = {interval_female[1] - interval_female[0]}")
```

```
90% Confidence Interval for  Male with Sample Size 300 is [8948.0 - 9922.0]
Range = 974.0

90% Confidence Interval for  Female with Sample Size 300 is [8298.0 - 9199.0]
Range = 901.0
```

Confidence Interval for 95%

In [39]:
```
percent = 95
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_male = np.percentile(male_mean , [left_interval,right_interval]).round(0)
interval_female = np.percentile(female_mean , [left_interval,right_interval]).round

print(f"95% Confidence Interval for  Male with Sample Size 300 is [{interval_male[0
print(f"Range = {interval_male[1] - interval_male[0]}")
print()
```

```
print(f"95% Confidence Interval for  Female with Sample Size 300 is [{interval_fema
print(f"Range = {interval_female[1] - interval_female[0]}")
```

```
95% Confidence Interval for  Male with Sample Size 300 is [8863.0 - 10010.0]
Range = 1147.0

95% Confidence Interval for  Female with Sample Size 300 is [8216.0 - 9294.0]
Range = 1078.0
```

Confidence Interval for 99%

In [40]:
```
percent = 99
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_male = np.percentile(male_mean , [left_interval,right_interval]).round(0)
interval_female = np.percentile(female_mean , [left_interval,right_interval]).rounc

print(f"99% Confidence Interval for  Male with Sample Size 300 is [{interval_male[0
print(f"Range = {interval_male[1] - interval_male[0]}")
print()
print(f"99% Confidence Interval for  Female with Sample Size 300 is [{interval_fema
print(f"Range = {interval_female[1] - interval_female[0]}")
```

```
99% Confidence Interval for  Male with Sample Size 300 is [8686.0 - 10214.0]
Range = 1528.0

99% Confidence Interval for  Female with Sample Size 300 is [8053.0 - 9457.0]
Range = 1404.0
```

Sample size = 3000

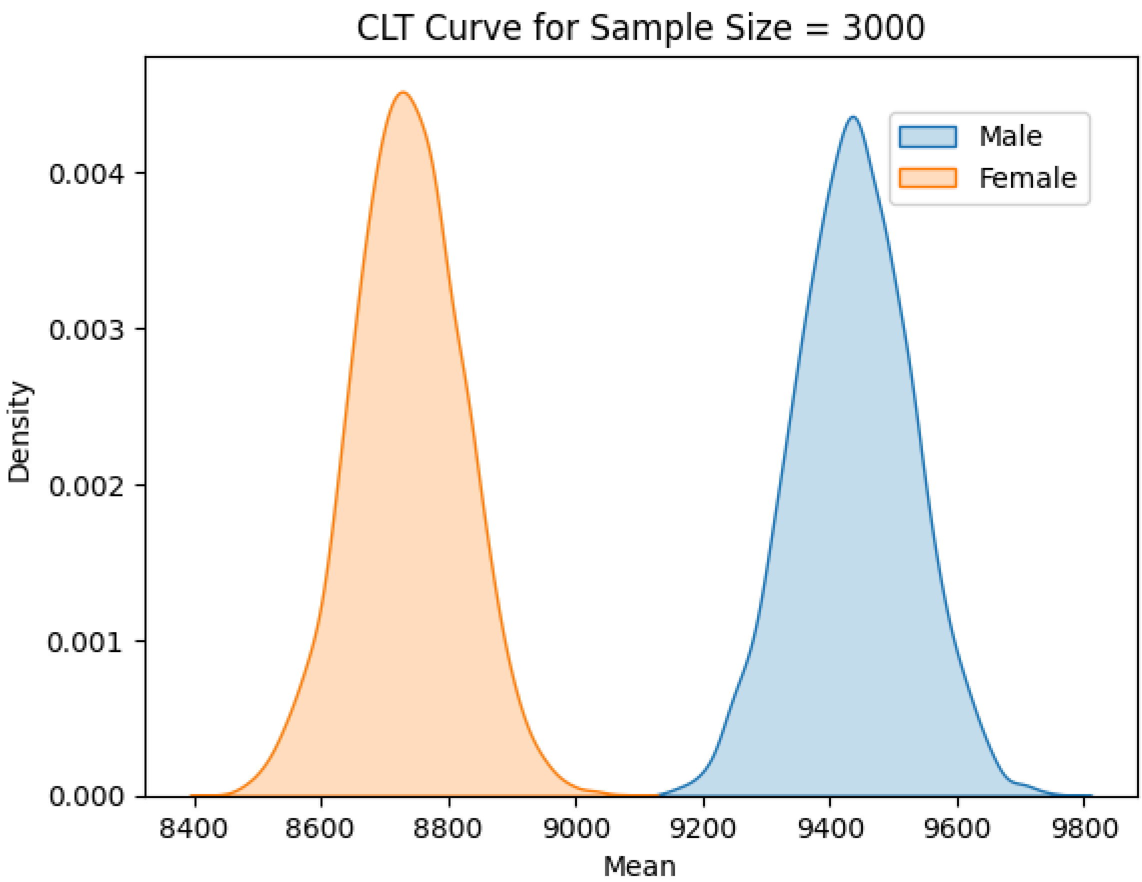
In [41]:
```
sample_size = 3000

male_mean = []
female_mean = []

for i in range(5000):
  male_sample = np.random.choice(dt_male , sample_size)
  female_sample = np.random.choice(dt_female , sample_size)

  m_mean = np.mean(male_sample)
  f_mean = np.mean(female_sample)

  male_mean.append(m_mean)
  female_mean.append(f_mean)

df_90_3000 = pd.DataFrame({"male_mean" : male_mean , "female_mean" : female_mean})
df_90_3000.head()
```

Out[41]:

	male_mean	female_mean
0	9264.163000	8569.972333
1	9341.568000	8869.975667
2	9268.110000	8777.965000
3	9420.633667	8684.167333
4	9465.189333	8782.804333

In [42]:
```
sns.kdeplot(x = df_90_3000["male_mean"], fill = True , label = "Male")
sns.kdeplot(x = df_90_3000["female_mean"], fill = True , label = "Female")
```

```
plt.legend(loc=(0.75,0.8))

plt.xlabel("Mean")
plt.title("CLT Curve for Sample Size = 3000")

plt.show()
```



Confidence Interval for 90%

In [43]:
```
percent = 90
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_male = np.percentile(male_mean , [left_interval,right_interval]).round(0)
interval_female = np.percentile(female_mean , [left_interval,right_interval]).round

print(f"90% Confidence Interval for  Male with Sample Size 3000 is [{interval_male[
print(f"Range = {interval_male[1] - interval_male[0]}")
print()
print(f"90% Confidence Interval for  Female with Sample Size 3000 is [{interval_fem
print(f"Range = {interval_female[1] - interval_female[0]}")
```

```
90% Confidence Interval for  Male with Sample Size 3000 is [9284.0 - 9588.0]
Range = 304.0

90% Confidence Interval for  Female with Sample Size 3000 is [8592.0 - 8879.0]
Range = 287.0
```

Confidence Interval for 95%

In [44]:
```
percent = 95
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_male = np.percentile(male_mean , [left_interval,right_interval]).round(0)
```

```
interval_female = np.percentile(female_mean , [left_interval,right_interval]).rounc

print(f"95% Confidence Interval for  Male with Sample Size 3000 is [{interval_male[
print(f"Range = {interval_male[1] - interval_male[0]}")
print()
print(f"95% Confidence Interval for  Female with Sample Size 3000 is [{interval_fem
print(f"Range = {interval_female[1] - interval_female[0]}")
```

```
95% Confidence Interval for  Male with Sample Size 3000 is [9255.0 - 9617.0]
Range = 362.0

95% Confidence Interval for  Female with Sample Size 3000 is [8564.0 - 8907.0]
Range = 343.0
```

Confidence Interval for 99%

In [45]:

```
percent = 99
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_male = np.percentile(male_mean , [left_interval,right_interval]).round(0)
interval_female = np.percentile(female_mean , [left_interval,right_interval]).rounc

print(f"99% Confidence Interval for  Male with Sample Size 3000 is [{interval_male[
print(f"Range = {interval_male[1] - interval_male[0]}")
print()
print(f"99% Confidence Interval for  Female with Sample Size 3000 is [{interval_fem
print(f"Range = {interval_female[1] - interval_female[0]}")
```

```
99% Confidence Interval for  Male with Sample Size 3000 is [9207.0 - 9668.0]
Range = 461.0

99% Confidence Interval for  Female with Sample Size 3000 is [8514.0 - 8963.0]
Range = 449.0
```

Sample size = 30,000

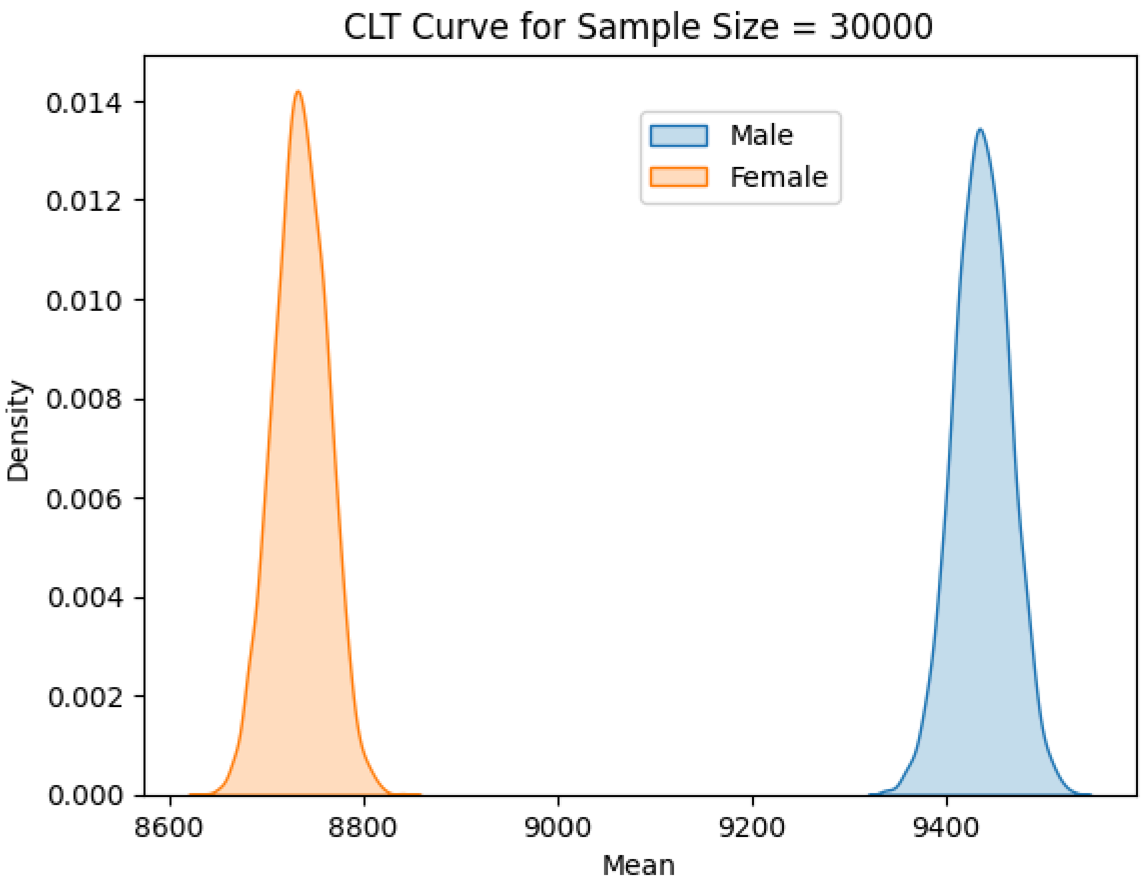
In [46]:

```
sample_size = 30000

male_mean = []
female_mean = []

for i in range(5000):
  male_sample = np.random.choice(dt_male , sample_size)
  female_sample = np.random.choice(dt_female , sample_size)

  m_mean = np.mean(male_sample)
  f_mean = np.mean(female_sample)

  male_mean.append(m_mean)
  female_mean.append(f_mean)

df_90_30000 = pd.DataFrame({"male_mean" : male_mean , "female_mean" : female_mean})
df_90_30000.head()
```

Out[46]:

	male_mean	female_mean
0	9420.193567	8733.382367
1	9408.529967	8732.975733
2	9417.139567	8786.832700
3	9434.607867	8734.412400
4	9424.207667	8759.065167

In [47]:
```
sns.kdeplot(x = df_90_30000["male_mean"], fill = True , label = "Male")
sns.kdeplot(x = df_90_30000["female_mean"], fill = True , label = "Female")
plt.legend(loc=(0.5,0.8))

plt.xlabel("Mean")
plt.title("CLT Curve for Sample Size = 30000")

plt.show()
```



Confidence Interval for 90%

In [48]:
```
percent = 90
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_male = np.percentile(male_mean , [left_interval,right_interval]).round(0)
interval_female = np.percentile(female_mean , [left_interval,right_interval]).round

print(f"99% Confidence Interval for  Male with Sample Size 30000 is [{interval_male
print(f"Range = {interval_male[1] - interval_male[0]}")
print()
```

```
print(f"99% Confidence Interval for  Female with Sample Size 30000 is [{interval_fe
print(f"Range = {interval_female[1] - interval_female[0]}")
```

```
99% Confidence Interval for  Male with Sample Size 30000 is [9389.0 - 9485.0]
Range = 96.0

99% Confidence Interval for  Female with Sample Size 30000 is [8688.0 - 8780.0]
Range = 92.0
```

Confidence Interval for 95%

In [49]:

```
percent = 95
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_male = np.percentile(male_mean , [left_interval,right_interval]).round(0)
interval_female = np.percentile(female_mean , [left_interval,right_interval]).rounc

print(f"99% Confidence Interval for  Male with Sample Size 30000 is [{interval_male
print(f"Range = {interval_male[1] - interval_male[0]}")
print()
print(f"99% Confidence Interval for  Female with Sample Size 30000 is [{interval_fe
print(f"Range = {interval_female[1] - interval_female[0]}")
```

```
99% Confidence Interval for  Male with Sample Size 30000 is [9380.0 - 9493.0]
Range = 113.0

99% Confidence Interval for  Female with Sample Size 30000 is [8680.0 - 8788.0]
Range = 108.0
```

Confidence Interval for 99%

In [50]:

```
percent = 99
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_male = np.percentile(male_mean , [left_interval,right_interval]).round(0)
interval_female = np.percentile(female_mean , [left_interval,right_interval]).rounc

print(f"99% Confidence Interval for  Male with Sample Size 30000 is [{interval_male
print(f"Range = {interval_male[1] - interval_male[0]}")
print()
print(f"99% Confidence Interval for  Female with Sample Size 30000 is [{interval_fe
print(f"Range = {interval_female[1] - interval_female[0]}")
```

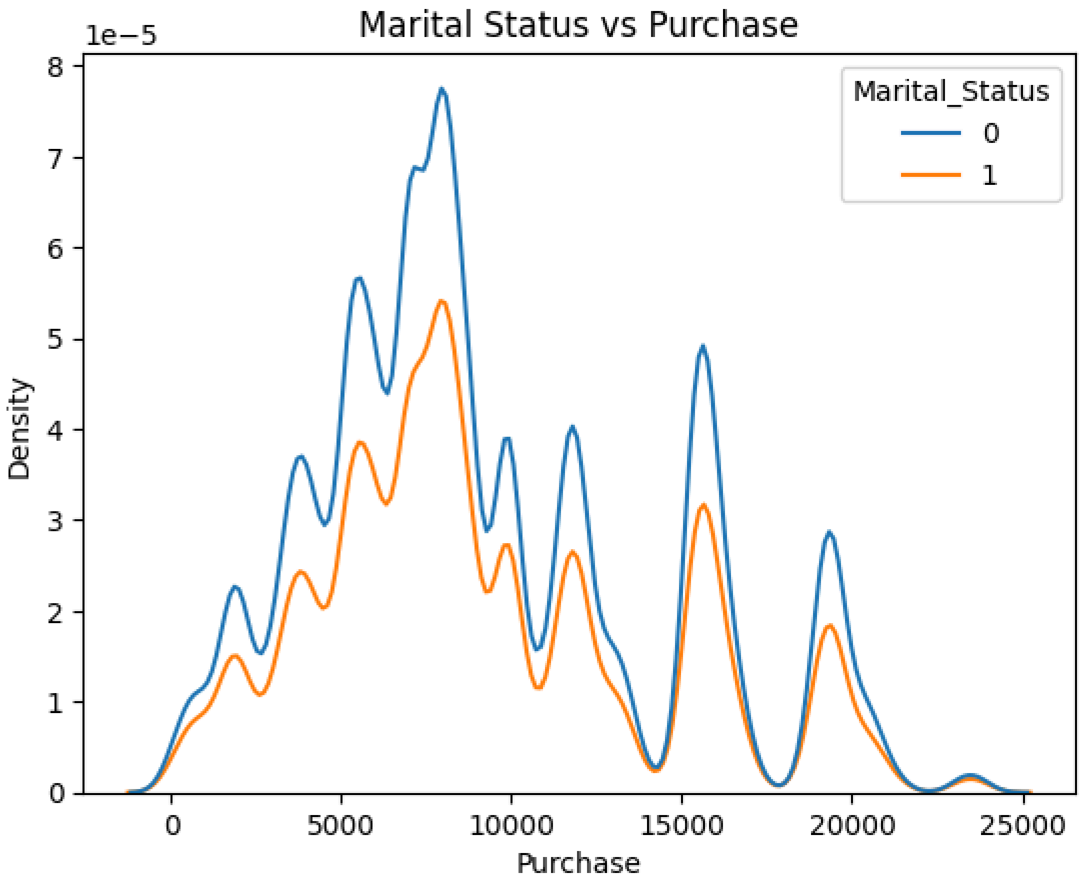
```
99% Confidence Interval for  Male with Sample Size 30000 is [9360.0 - 9512.0]
Range = 152.0

99% Confidence Interval for  Female with Sample Size 30000 is [8665.0 - 8806.0]
Range = 141.0
```

Insight :

- As the size of the sample increases the confidence interval is becoming more clear and accurate. Hence, more the sample size more precise is the data.
- From the above graphs its clear that as the sample size increases the CLT curves are not overlapping there by indicating a huge difference in the spending of amount by Male and Female.
- It is very clear that Male spent more money in comparison with Female in the Black Friday Sale.

Martital Status vs Purchase

In [51]:
```
sns.kdeplot(x = "Purchase" , hue = "Marital_Status" , data = data)
plt.title("Marital Status vs Purchase")

plt.show()
```



In [52]:
```
data_s = data.groupby("Marital_Status")["Purchase"].agg(["sum","count"]).reset_inde
data_s["Purchase Per Status"] = round(data_s["sum"]/data_s["count"],2)
data_s["Marital_Status"] = data_s["Marital_Status"].replace({0 : "Unmarried" , 1 :

data_s
```

Out[52]:

	Marital_Status	sum	count	Purchase Per Status
0	Unmarried	3008927447	324731	9265.91
1	Married	2086885295	225337	9261.17

Insight :

- From the above table we can clearly see that the average amount spend per transaction by both Married and Unmarried is almost same.
- However the total amount spend and the Purchase made by Unmarried people is much higher than the Married.

In [53]:
```
dt_married = data.loc[data["Marital_Status"]==1,"Purchase"]
dt_unmarried = data.loc[data["Marital_Status"]==0,"Purchase"]
```

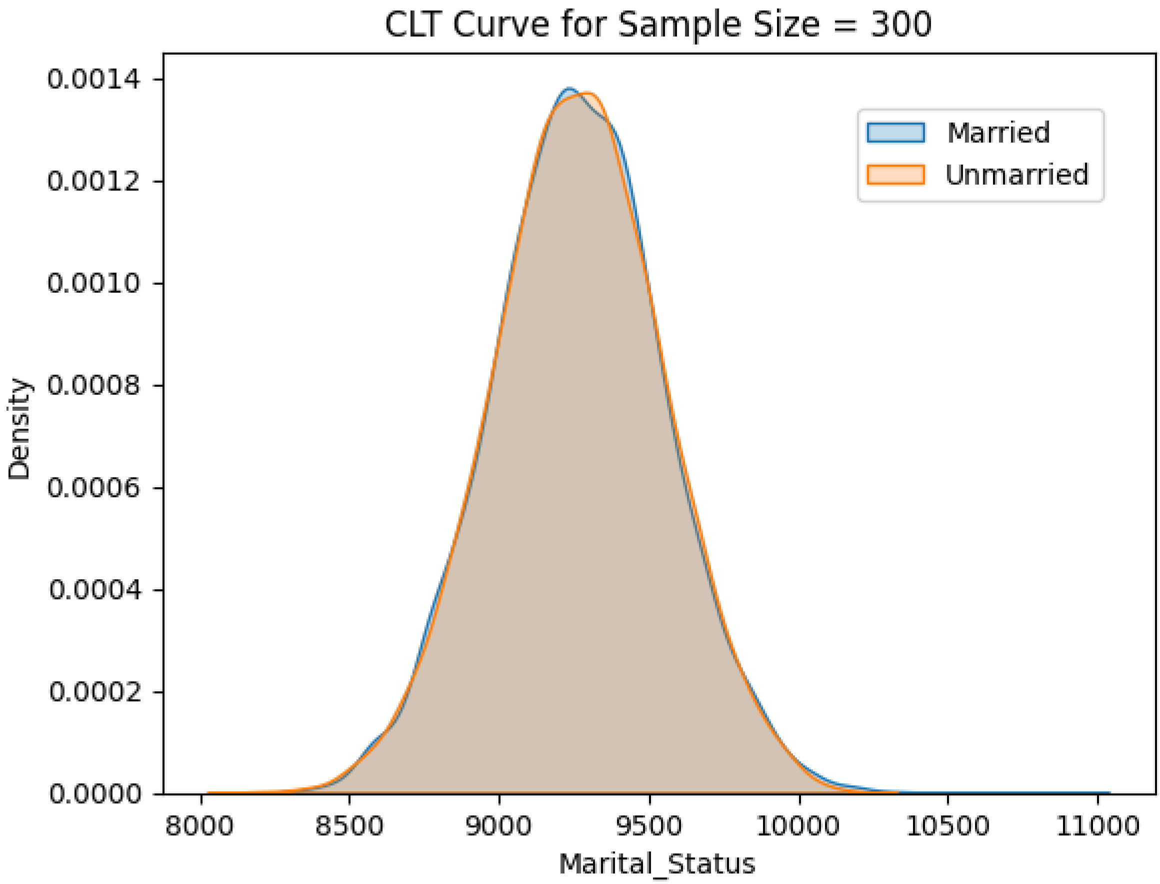
Sample Size = 300

In [54]:
```
sample_size = 300

married_mean = []
unmarried_mean = []

for i in range(5000):
  married_sample = np.random.choice(dt_married , sample_size)
  unmarried_sample = np.random.choice(dt_unmarried , sample_size)

  married_sample_mean = np.mean(married_sample)
  unmarried_sample_mean = np.mean(unmarried_sample)

  married_mean.append(married_sample_mean)
  unmarried_mean.append(unmarried_sample_mean)

df_300 = pd.DataFrame({"Married_mean" : married_mean , "Unmarried_mean" : unmarriec
df_300.head()
```

Out[54]:

	Married_mean	Unmarried_mean
0	9648.486667	9332.713333
1	9166.073333	8940.216667
2	9474.590000	9204.613333
3	8895.196667	9184.480000
4	9047.270000	9362.970000

In [55]:
```
sns.kdeplot(df_300["Married_mean"] , fill = True , label = "Married")
sns.kdeplot(df_300["Unmarried_mean"] , fill = True , label = "Unmarried")
plt.legend(loc = (0.7 , 0.8))

plt.xlabel("Marital_Status")

plt.title("CLT Curve for Sample Size = 300")
plt.show()
```



Confidence Interval for 90%

In [56]:
```
percent  = 90
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_married = np.percentile(married_mean , [left_interval , right_interval]).r
interval_unmarried = np.percentile(unmarried_mean , [left_interval , right_interval

print(f"90% Confidence Interval for  Married people with Sample Size 300 is [{inter
print(f"Range = {interval_married[1] - interval_married[0]}")
print()
print(f"90% Confidence Interval for Unmarried people with Sample Size 300 is [{inte
print(f"Range = {interval_unmarried[1] - interval_unmarried[0]}")
```

```
90% Confidence Interval for  Married people with Sample Size 300 is [8786.0 - 973
8.0]
Range = 952.0

90% Confidence Interval for Unmarried people with Sample Size 300 is [8793.0 - 973
1.0]
Range = 938.0
```

Confidence Interval for 95%

In [57]:
```
percent  = 95
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_married = np.percentile(married_mean , [left_interval , right_interval]).r
interval_unmarried = np.percentile(unmarried_mean , [left_interval , right_interval

print(f"95% Confidence Interval for  Married people with Sample Size 300 is [{inter
print(f"Range = {interval_married[1] - interval_married[0]}")
```

```
print()
print(f"95% Confidence Interval for Unmarried people with Sample Size 300 is [{inte
print(f"Range = {interval_unmarried[1] - interval_unmarried[0]}")
```

```
95% Confidence Interval for  Married people with Sample Size 300 is [8707.0 - 984
1.0]
Range = 1134.0

95% Confidence Interval for Unmarried people with Sample Size 300 is [8697.0 - 982
1.0]
Range = 1124.0
```

Confidence Interval for 99%

In [58]:
```
percent  = 99
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_married = np.percentile(married_mean , [left_interval , right_interval]).r
interval_unmarried = np.percentile(unmarried_mean , [left_interval , right_interval

print(f"99% Confidence Interval for  Married people with Sample Size 300 is [{inter
print(f"Range = {interval_married[1] - interval_married[0]}")
print()
print(f"99% Confidence Interval for Unmarried people with Sample Size 300 is [{inte
print(f"Range = {interval_unmarried[1] - interval_unmarried[0]}")
```

```
99% Confidence Interval for  Married people with Sample Size 300 is [8552.0 - 1001
9.0]
Range = 1467.0

99% Confidence Interval for Unmarried people with Sample Size 300 is [8523.0 - 996
6.0]
Range = 1443.0
```

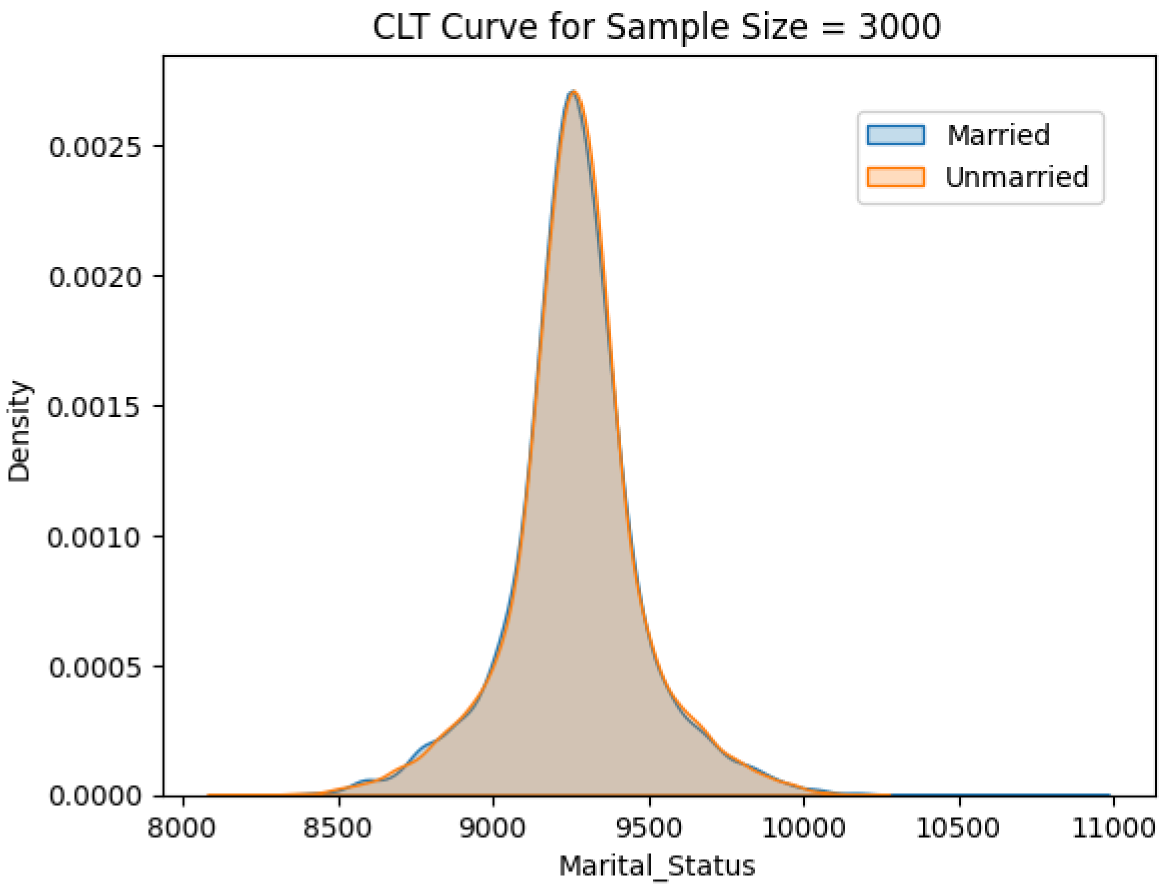
Sample Size = 3000

In [59]:
```
sample_size = 3000

mean_married = []
mean_unmarried = []

for i in range(5000):
  married_sample = np.random.choice(dt_married , sample_size)
  unmarried_sample = np.random.choice(dt_unmarried , sample_size)

  married_sample_mean = np.mean(married_sample)
  unmarried_sample_mean = np.mean(unmarried_sample)

  married_mean.append(married_sample_mean)
  unmarried_mean.append(unmarried_sample_mean)

df_3000 = pd.DataFrame({"Married_mean" : married_mean , "Unmarried_mean" : unmarrie
df_3000.head()
```

Out[59]:

	Married_mean	Unmarried_mean
0	9648.486667	9332.713333
1	9166.073333	8940.216667
2	9474.590000	9204.613333
3	8895.196667	9184.480000
4	9047.270000	9362.970000

In [60]:
```
sns.kdeplot(df_3000["Married_mean"] , fill = True , label = "Married")
sns.kdeplot(df_3000["Unmarried_mean"] , fill = True , label = "Unmarried")
plt.legend(loc = (0.7 , 0.8))

plt.xlabel("Marital_Status")

plt.title("CLT Curve for Sample Size = 3000")
plt.show()
```



Confidence Interval for 90%

In [61]:
```
percent  = 90
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_married = np.percentile(married_mean , [left_interval , right_interval]).r
interval_unmarried = np.percentile(unmarried_mean , [left_interval , right_interval

print(f"90% Confidence Interval for  Married people with Sample Size 3000 is [{inte
print(f"Range = {interval_married[1] - interval_married[0]}")
print()
```

```
print(f"90% Confidence Interval for Unmarried people with Sample Size 3000 is [{int
print(f"Range = {interval_unmarried[1] - interval_unmarried[0]}")
```

```
90% Confidence Interval for  Married people with Sample Size 3000 is [8893.0 - 963
3.0]
Range = 740.0

90% Confidence Interval for Unmarried people with Sample Size 3000 is [8895.0 - 96
30.0]
Range = 735.0
```

Confidence Interval for 95%

In [62]:
```
percent  = 95
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_married = np.percentile(married_mean , [left_interval , right_interval]).r
interval_unmarried = np.percentile(unmarried_mean , [left_interval , right_interval

print(f"95% Confidence Interval for  Married people with Sample Size 3000 is [{inte
print(f"Range = {interval_married[1] - interval_married[0]}")
print()
print(f"95% Confidence Interval for Unmarried people with Sample Size 3000 is [{int
print(f"Range = {interval_unmarried[1] - interval_unmarried[0]}")
```

```
95% Confidence Interval for  Married people with Sample Size 3000 is [8786.0 - 973
8.0]
Range = 952.0

95% Confidence Interval for Unmarried people with Sample Size 3000 is [8793.0 - 97
31.0]
Range = 938.0
```

Confidence Interval for 99%

In [63]:
```
percent  = 99
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_married = np.percentile(married_mean , [left_interval , right_interval]).r
interval_unmarried = np.percentile(unmarried_mean , [left_interval , right_interval

print(f"99% Confidence Interval for  Married people with Sample Size 3000 is [{inte
print(f"Range = {interval_married[1] - interval_married[0]}")
print()
print(f"99% Confidence Interval for Unmarried people with Sample Size 3000 is [{int
print(f"Range = {interval_unmarried[1] - interval_unmarried[0]}")
```

```
99% Confidence Interval for  Married people with Sample Size 3000 is [8590.0 - 994
3.0]
Range = 1353.0

99% Confidence Interval for Unmarried people with Sample Size 3000 is [8593.0 - 99
21.0]
Range = 1328.0
```

Sample Size = 30000

In [64]:
```
sample_size = 30000

mean_married = []
mean_unmarried = []
```

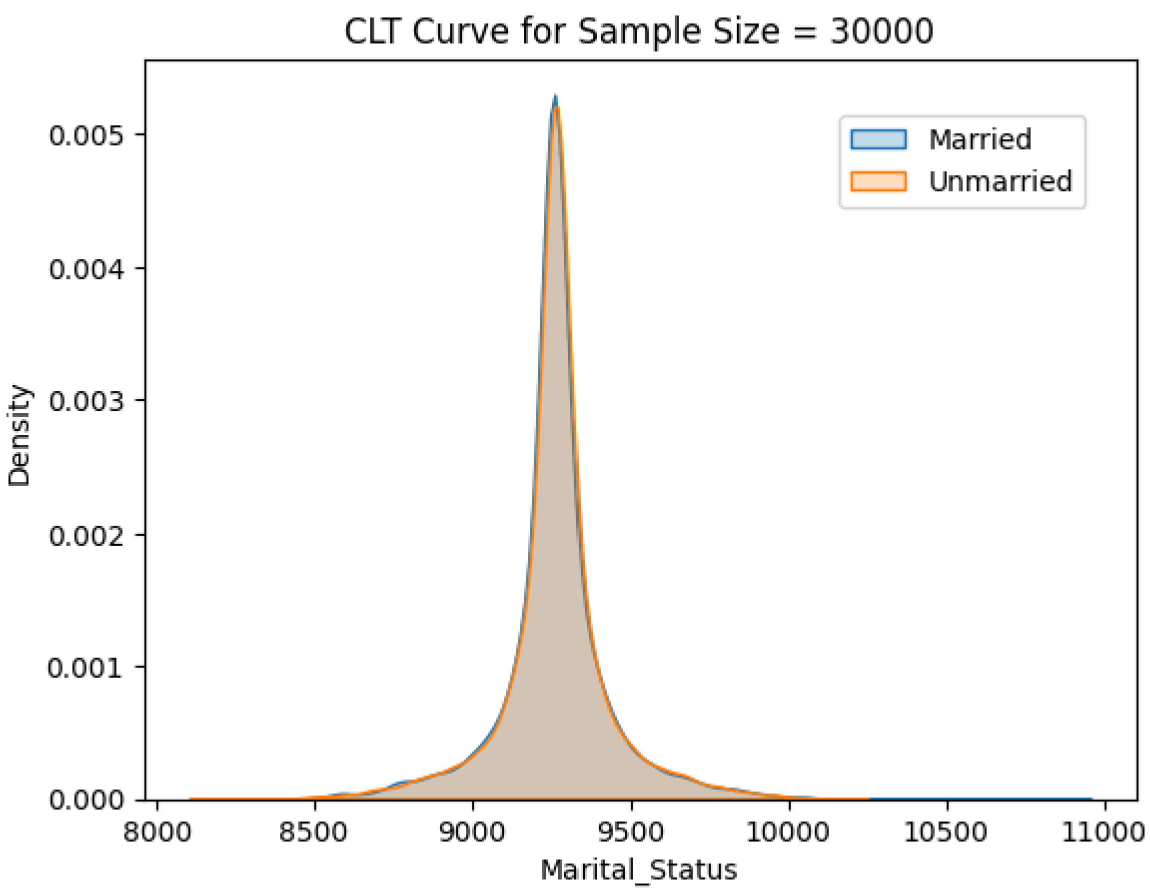
```
for i in range(5000):
  married_sample = np.random.choice(dt_married , sample_size)
  unmarried_sample = np.random.choice(dt_unmarried , sample_size)

  married_sample_mean = np.mean(married_sample)
  unmarried_sample_mean = np.mean(unmarried_sample)

  married_mean.append(married_sample_mean)
  unmarried_mean.append(unmarried_sample_mean)

df_30000 = pd.DataFrame({"Married_mean" : married_mean , "Unmarried_mean" : unmarri
df_30000.head()
```

Out[64]:

	Married_mean	Unmarried_mean
0	9648.486667	9332.713333
1	9166.073333	8940.216667
2	9474.590000	9204.613333
3	8895.196667	9184.480000
4	9047.270000	9362.970000

In [65]:

```
sns.kdeplot(df_30000["Married_mean"] , fill = True , label = "Married")
sns.kdeplot(df_30000["Unmarried_mean"] , fill = True , label = "Unmarried")
plt.legend(loc = (0.7 , 0.8))

plt.xlabel("Marital_Status")

plt.title("CLT Curve for Sample Size = 30000")
plt.show()
```



Confidence Interval for 90%

In [66]:
```
percent  = 90
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_married = np.percentile(married_mean , [left_interval , right_interval]).r
interval_unmarried = np.percentile(unmarried_mean , [left_interval , right_interval

print(f"90% Confidence Interval for  Married people with Sample Size 30000 is [{int
print(f"Range = {interval_married[1] - interval_married[0]}")
print()
print(f"90% Confidence Interval for Unmarried people with Sample Size 30000 is [{ir
print(f"Range = {interval_unmarried[1] - interval_unmarried[0]}")
```

```
90% Confidence Interval for  Married people with Sample Size 30000 is [8969.0 - 95
55.0]
Range = 586.0

90% Confidence Interval for Unmarried people with Sample Size 30000 is [8967.0 - 9
560.0]
Range = 593.0
```

Confidence Interval for 95%

In [67]:
```
percent  = 95
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_married = np.percentile(married_mean , [left_interval , right_interval]).r
interval_unmarried = np.percentile(unmarried_mean , [left_interval , right_interval

print(f"95% Confidence Interval for  Married people with Sample Size 30000 is [{int
print(f"Range = {interval_married[1] - interval_married[0]}")
print()
print(f"95% Confidence Interval for Unmarried people with Sample Size 30000 is [{ir
print(f"Range = {interval_unmarried[1] - interval_unmarried[0]}")
```

```
95% Confidence Interval for  Married people with Sample Size 30000 is [8846.0 - 96
76.0]
Range = 830.0

95% Confidence Interval for Unmarried people with Sample Size 30000 is [8852.0 - 9
673.0]
Range = 821.0
```

Confidence Interval for 99%

In [68]:
```
percent  = 99
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_married = np.percentile(married_mean , [left_interval , right_interval]).r
interval_unmarried = np.percentile(unmarried_mean , [left_interval , right_interval

print(f"99% Confidence Interval for  Married people with Sample Size 30000 is [{int
print(f"Range = {interval_married[1] - interval_married[0]}")
print()
print(f"99% Confidence Interval for Unmarried people with Sample Size 30000 is [{ir
print(f"Range = {interval_unmarried[1] - interval_unmarried[0]}")
```

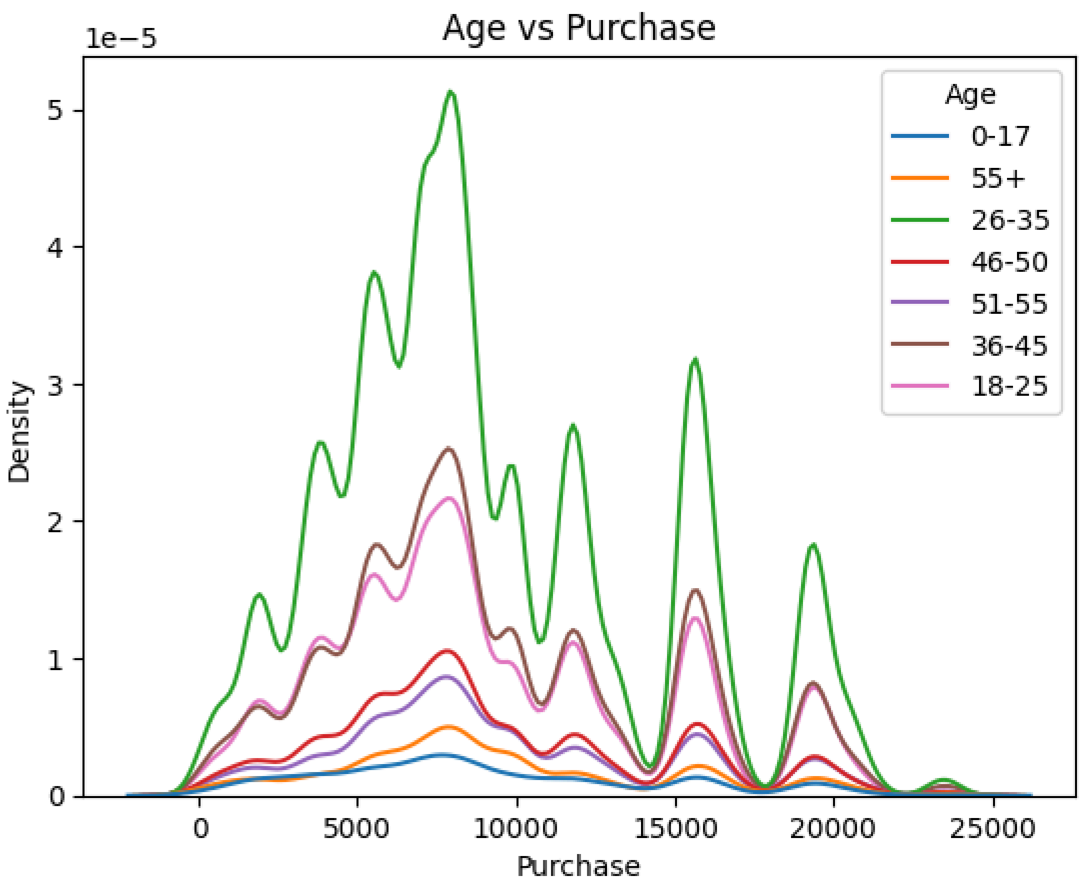
```
99% Confidence Interval for  Married people with Sample Size 30000 is [8634.0 - 98
97.0]
Range = 1263.0

99% Confidence Interval for Unmarried people with Sample Size 30000 is [8635.0 - 9
880.0]
Range = 1245.0
```

Insight :

- As the size of the sample increases the confidence interval is becoming more clear and accurate. Hence, more the sample size more precise is the data.
- From the above graphs its clear that as the sample size increases the CLT curves are overlapping there by indicating the amount spent by both Married and Unmarried people are almost same.
- Hence both Married and Unmarried people had equal contribution in the Black Friday Sale.

Age vs Purchase

In [69]:
```
sns.kdeplot(x = "Purchase" , hue = "Age" , data = data)

plt.title("Age vs Purchase")
plt.show()
```



In [70]:
```
temp_age = data.groupby("Age")["Purchase"].agg(["sum","count"]).reset_index()
temp_age["Purchase_per_Age"] = np.round(temp_age["sum"]/temp_age["count"],2)
```

```
temp_age
```

Out[70]:

	Age	sum	count	Purchase_per_Age
0	0-17	134913183	15102	8933.46
1	18-25	913848675	99660	9169.66
2	26-35	2031770578	219587	9252.69
3	36-45	1026569884	110013	9331.35
4	46-50	420843403	45701	9208.63
5	51-55	367099644	38501	9534.81
6	55+	200767375	21504	9336.28

Insight :

- Age group from 26 - 45 has the major contribution tot he purchase made in the sale.
- Still as per the amount per transaction is almost same for all the age groups where 0 -17 has the least purchase whereas 51 - 55 has the most purchase.

In [71]:

```
dt_0_17 = data.loc[data["Age"]=="0-17","Purchase"]
dt_18_25 = data.loc[data["Age"]=="18-25","Purchase"]
dt_26_35 = data.loc[data["Age"]=="26-35","Purchase"]
dt_36_45 = data.loc[data["Age"]=="36-45","Purchase"]
dt_46_50 = data.loc[data["Age"]=="46-50","Purchase"]
dt_51_55 = data.loc[data["Age"]=="51-55","Purchase"]
dt_55 = data.loc[data["Age"]=="55+","Purchase"]
```

Sample Size = 300

In [72]:

```
sample_size = 300

mean_0_17 = []
mean_18_25 = []
mean_26_35 = []
mean_36_45 = []
mean_46_50 = []
mean_51_55 = []
mean_55 = []

for i in range(5000):
  sample_17 = np.random.choice(dt_0_17 , sample_size)
  sample_25 = np.random.choice(dt_18_25 , sample_size)
  sample_35 = np.random.choice(dt_26_35 , sample_size)
  sample_45 = np.random.choice(dt_36_45 , sample_size)
  sample_50 = np.random.choice(dt_46_50 , sample_size)
  sample_55 = np.random.choice(dt_51_55 , sample_size)
  sample_56 = np.random.choice(dt_55 , sample_size)

  sample_mean_17 = np.mean(sample_17)
  sample_mean_25 = np.mean(sample_25)
  sample_mean_35 = np.mean(sample_35)
  sample_mean_45 = np.mean(sample_45)
  sample_mean_50 = np.mean(sample_50)
  sample_mean_55 = np.mean(sample_55)
  sample_mean_56 = np.mean(sample_56)

  mean_0_17.append(sample_mean_17)
```

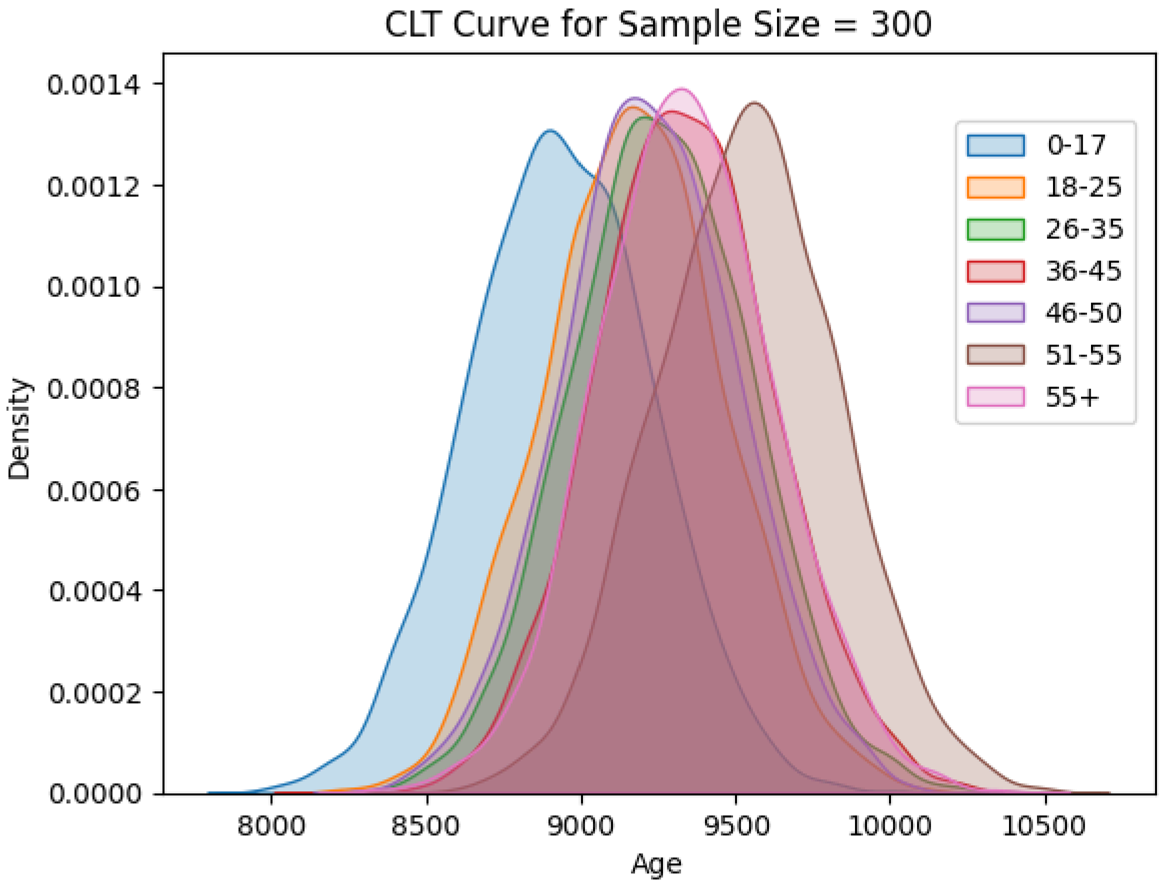
```
    mean_18_25.append(sample_mean_25)
    mean_26_35.append(sample_mean_35)
    mean_36_45.append(sample_mean_45)
    mean_46_50.append(sample_mean_50)
    mean_51_55.append(sample_mean_55)
    mean_55.append(sample_mean_56)

df_300 = pd.DataFrame({"0-17" : mean_0_17 , "18-25" : mean_18_25 ,"26-35" : mean_26
df_300.head()
```

Out[72]:

	0-17	18-25	26-35	36-45	46-50	51-55	55+
0	9764.646667	8987.250000	9389.456667	9511.370000	9645.320000	8994.763333	9387.053333
1	9048.710000	8936.996667	9203.400000	9910.556667	9731.003333	9663.170000	9469.976667
2	9337.380000	8798.350000	9673.706667	9316.186667	9756.430000	9380.230000	8782.866667
3	8398.983333	9317.833333	8893.780000	9411.373333	9135.843333	9453.246667	9331.743333
4	9012.163333	9032.513333	9511.566667	8553.773333	9509.530000	9079.936667	9322.836667

In [73]:

```
sns.kdeplot(df_300["0-17"] , fill = True , label = "0-17")
sns.kdeplot(df_300["18-25"] , fill = True , label = "18-25")
sns.kdeplot(df_300["26-35"] , fill = True , label = "26-35")
sns.kdeplot(df_300["36-45"] , fill = True , label = "36-45")
sns.kdeplot(df_300["46-50"] , fill = True , label = "46-50")
sns.kdeplot(df_300["51-55"] , fill = True , label = "51-55")
sns.kdeplot(df_300["55+"] , fill = True , label = "55+")
plt.legend(loc = (0.8 , 0.5))

plt.xlabel("Age")

plt.title("CLT Curve for Sample Size = 300")
plt.show()
```



Confidence Interval for 90%

In [74]:

```
percent  = 90
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_age_17 = np.percentile(mean_0_17 , [left_interval , right_interval]).round
interval_age_25 = np.percentile(mean_18_25 , [left_interval , right_interval]).rour
interval_age_35 = np.percentile(mean_26_35 , [left_interval , right_interval]).rour
interval_age_45 = np.percentile(mean_36_45 , [left_interval , right_interval]).rour
interval_age_50 = np.percentile(mean_46_50 , [left_interval , right_interval]).rour
interval_age_55 = np.percentile(mean_51_55 , [left_interval , right_interval]).rour
interval_age_56 = np.percentile(mean_55 , [left_interval , right_interval]).round(

print(f"90% Confidence Interval for people with age 0 - 17 and Sample Size 300 is [
print(f"Range = {interval_age_17[1] - interval_age_17[0]}")
print()
print(f"90% Confidence Interval for people with age 18 - 25 and Sample Size 300 is
print(f"Range = {interval_age_25[1] - interval_age_25[0]}")
print()
print(f"90% Confidence Interval for people with age 26 - 35 and Sample Size 300 is
print(f"Range = {interval_age_35[1] - interval_age_35[0]}")
print()
print(f"90% Confidence Interval for people with age 36 - 45 and Sample Size 300 is
print(f"Range = {interval_age_45[1] - interval_age_45[0]}")
print()
print(f"90% Confidence Interval for people with age 46 - 50 and Sample Size 300 is
print(f"Range = {interval_age_50[1] - interval_age_50[0]}")
print()
print(f"90% Confidence Interval for people with age 51 - 55 and Sample Size 300 is
print(f"Range = {interval_age_55[1] - interval_age_55[0]}")
print()
print(f"90% Confidence Interval for people with age 55+ and Sample Size 300 is [{ir
print(f"Range = {interval_age_56[1] - interval_age_56[0]}")
```

```
90% Confidence Interval for people with age 0 - 17 and Sample Size 300 is [8441.0
- 9423.0]
Range = 982.0

90% Confidence Interval for people with age 18 - 25 and Sample Size 300 is [8696.0
- 9648.0]
Range = 952.0

90% Confidence Interval for people with age 26 - 35 and Sample Size 300 is [8788.0
- 9739.0]
Range = 951.0

90% Confidence Interval for people with age 36 - 45 and Sample Size 300 is [8864.0
- 9824.0]
Range = 960.0

90% Confidence Interval for people with age 46 - 50 and Sample Size 300 is [8757.0
- 9701.0]
Range = 944.0

90% Confidence Interval for people with age 51 - 55 and Sample Size 300 is [9059.0
- 10024.0]
Range = 965.0

90% Confidence Interval for people with age 55+ and Sample Size 300 is [8883.0 - 9
825.0]
Range = 942.0
```

Confidence Interval for 95%

In [75]:

```
percent  = 95
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_age_17 = np.percentile(mean_0_17 , [left_interval , right_interval]).round
interval_age_25 = np.percentile(mean_18_25 , [left_interval , right_interval]).rour
interval_age_35 = np.percentile(mean_26_35 , [left_interval , right_interval]).rour
interval_age_45 = np.percentile(mean_36_45 , [left_interval , right_interval]).rour
interval_age_50 = np.percentile(mean_46_50 , [left_interval , right_interval]).rour
interval_age_55 = np.percentile(mean_51_55 , [left_interval , right_interval]).rour
interval_age_56 = np.percentile(mean_55 , [left_interval , right_interval]).round(0

print(f"95% Confidence Interval for people with age 0 - 17 and Sample Size 300 is [
print(f"Range = {interval_age_17[1] - interval_age_17[0]}")
print()
print(f"95% Confidence Interval for people with age 18 - 25 and Sample Size 300 is
print(f"Range = {interval_age_25[1] - interval_age_25[0]}")
print()
print(f"95% Confidence Interval for people with age 26 - 35 and Sample Size 300 is
print(f"Range = {interval_age_35[1] - interval_age_35[0]}")
print()
print(f"95% Confidence Interval for people with age 36 - 45 and Sample Size 300 is
print(f"Range = {interval_age_45[1] - interval_age_45[0]}")
print()
print(f"95% Confidence Interval for people with age 46 - 50 and Sample Size 300 is
print(f"Range = {interval_age_50[1] - interval_age_50[0]}")
print()
print(f"95% Confidence Interval for people with age 51 - 55 and Sample Size 300 is
print(f"Range = {interval_age_55[1] - interval_age_55[0]}")
print()
print(f"95% Confidence Interval for people with age 55+ and Sample Size 300 is [{ir
print(f"Range = {interval_age_56[1] - interval_age_56[0]}")
```

```
95% Confidence Interval for people with age 0 - 17 and Sample Size 300 is [8360.0
- 9515.0]
Range = 1155.0

95% Confidence Interval for people with age 18 - 25 and Sample Size 300 is [8621.0
- 9751.0]
Range = 1130.0

95% Confidence Interval for people with age 26 - 35 and Sample Size 300 is [8694.0
- 9834.0]
Range = 1140.0

95% Confidence Interval for people with age 36 - 45 and Sample Size 300 is [8783.0
- 9912.0]
Range = 1129.0

95% Confidence Interval for people with age 46 - 50 and Sample Size 300 is [8664.0
- 9790.0]
Range = 1126.0

95% Confidence Interval for people with age 51 - 55 and Sample Size 300 is [8966.0
- 10120.0]
Range = 1154.0

95% Confidence Interval for people with age 55+ and Sample Size 300 is [8779.0 - 9
915.0]
Range = 1136.0
```

Confidence Interval for 99%

In [76]:

```
percent  = 99
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_age_17 = np.percentile(mean_0_17 , [left_interval , right_interval]).round
interval_age_25 = np.percentile(mean_18_25 , [left_interval , right_interval]).rour
interval_age_35 = np.percentile(mean_26_35 , [left_interval , right_interval]).rour
interval_age_45 = np.percentile(mean_36_45 , [left_interval , right_interval]).rour
interval_age_50 = np.percentile(mean_46_50 , [left_interval , right_interval]).rour
interval_age_55 = np.percentile(mean_51_55 , [left_interval , right_interval]).rour
interval_age_56 = np.percentile(mean_55 , [left_interval , right_interval]).round(

print(f"99% Confidence Interval for people with age 0 - 17 and Sample Size 300 is [
print(f"Range = {interval_age_17[1] - interval_age_17[0]}")
print()
print(f"99% Confidence Interval for people with age 18 - 25 and Sample Size 300 is
print(f"Range = {interval_age_25[1] - interval_age_25[0]}")
print()
print(f"99% Confidence Interval for people with age 26 - 35 and Sample Size 300 is
print(f"Range = {interval_age_35[1] - interval_age_35[0]}")
print()
print(f"99% Confidence Interval for people with age 36 - 45 and Sample Size 300 is
print(f"Range = {interval_age_45[1] - interval_age_45[0]}")
print()
print(f"99% Confidence Interval for people with age 46 - 50 and Sample Size 300 is
print(f"Range = {interval_age_50[1] - interval_age_50[0]}")
print()
print(f"99% Confidence Interval for people with age 51 - 55 and Sample Size 300 is
print(f"Range = {interval_age_55[1] - interval_age_55[0]}")
print()
print(f"99% Confidence Interval for people with age 55+ and Sample Size 300 is [{ir
print(f"Range = {interval_age_56[1] - interval_age_56[0]}")
```

```
99% Confidence Interval for people with age 0 - 17 and Sample Size 300 is [8168.0
- 9710.0]
Range = 1542.0

99% Confidence Interval for people with age 18 - 25 and Sample Size 300 is [8448.0
- 9942.0]
Range = 1494.0

99% Confidence Interval for people with age 26 - 35 and Sample Size 300 is [8528.0
- 10033.0]
Range = 1505.0

99% Confidence Interval for people with age 36 - 45 and Sample Size 300 is [8614.0
- 10081.0]
Range = 1467.0

99% Confidence Interval for people with age 46 - 50 and Sample Size 300 is [8504.0
- 9936.0]
Range = 1432.0

99% Confidence Interval for people with age 51 - 55 and Sample Size 300 is [8778.0
- 10307.0]
Range = 1529.0

99% Confidence Interval for people with age 55+ and Sample Size 300 is [8575.0 - 1
0123.0]
Range = 1548.0
```

Sample Size = 3000

In [77]:

```
sample_size = 3000

mean_0_17 = []
mean_18_25 = []
mean_26_35 = []
mean_36_45 = []
mean_46_50 = []
mean_51_55 = []
mean_55 = []

for i in range(5000):
  sample_17 = np.random.choice(dt_0_17 , sample_size)
  sample_25 = np.random.choice(dt_18_25 , sample_size)
  sample_35 = np.random.choice(dt_26_35 , sample_size)
  sample_45 = np.random.choice(dt_36_45 , sample_size)
  sample_50 = np.random.choice(dt_46_50 , sample_size)
  sample_55 = np.random.choice(dt_51_55 , sample_size)
  sample_56 = np.random.choice(dt_55 , sample_size)

  sample_mean_17 = np.mean(sample_17)
  sample_mean_25 = np.mean(sample_25)
  sample_mean_35 = np.mean(sample_35)
  sample_mean_45 = np.mean(sample_45)
  sample_mean_50 = np.mean(sample_50)
  sample_mean_55 = np.mean(sample_55)
  sample_mean_56 = np.mean(sample_56)

  mean_0_17.append(sample_mean_17)
  mean_18_25.append(sample_mean_25)
  mean_26_35.append(sample_mean_35)
  mean_36_45.append(sample_mean_45)
  mean_46_50.append(sample_mean_50)
  mean_51_55.append(sample_mean_55)
  mean_55.append(sample_mean_56)
```

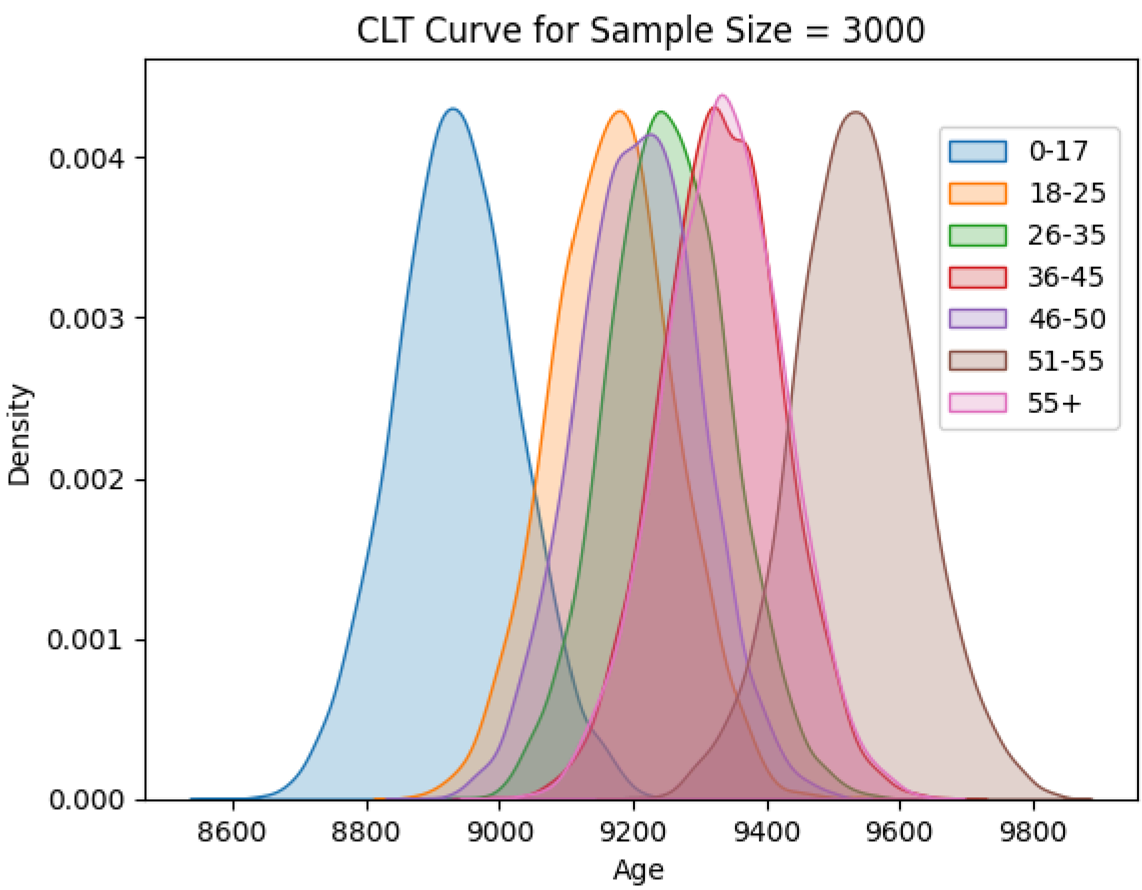
```
df_3000 = pd.DataFrame({"0-17" : mean_0_17 , "18-25" : mean_18_25 ,"26-35" : mean_2
df_3000.head()
```

Out[77]:

	0-17	18-25	26-35	36-45	46-50	51-55	55+
0	8907.422333	9157.680000	9338.818333	9416.406667	9278.374667	9412.884333	9416.553333
1	8809.494667	9231.952000	9306.172333	9416.462333	9221.085333	9538.459000	9396.230667
2	8843.560333	9370.524667	9329.497000	9306.756667	9242.761000	9380.185667	9267.740333
3	8838.600333	9043.273333	9098.243333	9450.904000	9369.019000	9461.449333	9396.152667
4	8924.400000	9160.334333	9376.555000	9334.163333	8942.339667	9430.160667	9286.047667

In [78]:

```
sns.kdeplot(df_3000["0-17"] , fill = True , label = "0-17")
sns.kdeplot(df_3000["18-25"] , fill = True , label = "18-25")
sns.kdeplot(df_3000["26-35"] , fill = True , label = "26-35")
sns.kdeplot(df_3000["36-45"] , fill = True , label = "36-45")
sns.kdeplot(df_3000["46-50"] , fill = True , label = "46-50")
sns.kdeplot(df_3000["51-55"] , fill = True , label = "51-55")
sns.kdeplot(df_3000["55+"] , fill = True , label = "55+")
plt.legend(loc = (0.8 , 0.5))

plt.xlabel("Age")

plt.title("CLT Curve for Sample Size = 3000")
plt.show()
```



Confidence Interval for 90%

In [79]:
```
percent  = 90
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_age_17 = np.percentile(mean_0_17 , [left_interval , right_interval]).rounc
interval_age_25 = np.percentile(mean_18_25 , [left_interval , right_interval]).rour
interval_age_35 = np.percentile(mean_26_35 , [left_interval , right_interval]).rour
interval_age_45 = np.percentile(mean_36_45 , [left_interval , right_interval]).rour
interval_age_50 = np.percentile(mean_46_50 , [left_interval , right_interval]).rour
interval_age_55 = np.percentile(mean_51_55 , [left_interval , right_interval]).rour
interval_age_56 = np.percentile(mean_55 , [left_interval , right_interval]).round(0

print(f"90% Confidence Interval for people with age 0 - 17 and Sample Size 3000 is 
print(f"Range = {interval_age_17[1] - interval_age_17[0]}")
print()
print(f"90% Confidence Interval for people with age 18 - 25 and Sample Size 3000 is
print(f"Range = {interval_age_25[1] - interval_age_25[0]}")
print()
print(f"90% Confidence Interval for people with age 26 - 35 and Sample Size 3000 is
print(f"Range = {interval_age_35[1] - interval_age_35[0]}")
print()
print(f"90% Confidence Interval for people with age 36 - 45 and Sample Size 3000 is
print(f"Range = {interval_age_45[1] - interval_age_45[0]}")
print()
print(f"90% Confidence Interval for people with age 46 - 50 and Sample Size 3000 is
print(f"Range = {interval_age_50[1] - interval_age_50[0]}")
print()
print(f"90% Confidence Interval for people with age 51 - 55 and Sample Size 3000 is
print(f"Range = {interval_age_55[1] - interval_age_55[0]}")
print()
print(f"90% Confidence Interval for people with age 55+ and Sample Size 3000 is [{i
print(f"Range = {interval_age_56[1] - interval_age_56[0]}")
```

```
90% Confidence Interval for people with age 0 - 17 and Sample Size 3000 is [8782.0
- 9088.0]
Range = 306.0

90% Confidence Interval for people with age 18 - 25 and Sample Size 3000 is [9017.
0 - 9322.0]
Range = 305.0

90% Confidence Interval for people with age 26 - 35 and Sample Size 3000 is [9105.
0 - 9404.0]
Range = 299.0

90% Confidence Interval for people with age 36 - 45 and Sample Size 3000 is [9180.
0 - 9484.0]
Range = 304.0

90% Confidence Interval for people with age 46 - 50 and Sample Size 3000 is [9056.
0 - 9356.0]
Range = 300.0

90% Confidence Interval for people with age 51 - 55 and Sample Size 3000 is [9383.
0 - 9691.0]
Range = 308.0

90% Confidence Interval for people with age 55+ and Sample Size 3000 is [9182.0 -
9486.0]
Range = 304.0
```

Confidence Interval for 95%

In [80]:
```
percent  = 95
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_age_17 = np.percentile(mean_0_17 , [left_interval , right_interval]).round
interval_age_25 = np.percentile(mean_18_25 , [left_interval , right_interval]).rour
interval_age_35 = np.percentile(mean_26_35 , [left_interval , right_interval]).rour
interval_age_45 = np.percentile(mean_36_45 , [left_interval , right_interval]).rour
interval_age_50 = np.percentile(mean_46_50 , [left_interval , right_interval]).rour
interval_age_55 = np.percentile(mean_51_55 , [left_interval , right_interval]).rour
interval_age_56 = np.percentile(mean_55 , [left_interval , right_interval]).round(

print(f"95% Confidence Interval for people with age 0 - 17 and Sample Size 3000 is
print(f"Range = {interval_age_17[1] - interval_age_17[0]}")
print()
print(f"95% Confidence Interval for people with age 18 - 25 and Sample Size 3000 is
print(f"Range = {interval_age_25[1] - interval_age_25[0]}")
print()
print(f"95% Confidence Interval for people with age 26 - 35 and Sample Size 3000 is
print(f"Range = {interval_age_35[1] - interval_age_35[0]}")
print()
print(f"95% Confidence Interval for people with age 36 - 45 and Sample Size 3000 is
print(f"Range = {interval_age_45[1] - interval_age_45[0]}")
print()
print(f"95% Confidence Interval for people with age 46 - 50 and Sample Size 3000 is
print(f"Range = {interval_age_50[1] - interval_age_50[0]}")
print()
print(f"95% Confidence Interval for people with age 51 - 55 and Sample Size 3000 is
print(f"Range = {interval_age_55[1] - interval_age_55[0]}")
print()
print(f"95% Confidence Interval for people with age 55+ and Sample Size 3000 is [{i
print(f"Range = {interval_age_56[1] - interval_age_56[0]}")
```

```
95% Confidence Interval for people with age 0 - 17 and Sample Size 3000 is [8755.0
- 9119.0]
Range = 364.0

95% Confidence Interval for people with age 18 - 25 and Sample Size 3000 is [8990.
0 - 9354.0]
Range = 364.0

95% Confidence Interval for people with age 26 - 35 and Sample Size 3000 is [9077.
0 - 9434.0]
Range = 357.0

95% Confidence Interval for people with age 36 - 45 and Sample Size 3000 is [9152.
0 - 9510.0]
Range = 358.0

95% Confidence Interval for people with age 46 - 50 and Sample Size 3000 is [9029.
0 - 9387.0]
Range = 358.0

95% Confidence Interval for people with age 51 - 55 and Sample Size 3000 is [9349.
0 - 9725.0]
Range = 376.0

95% Confidence Interval for people with age 55+ and Sample Size 3000 is [9151.0 -
9514.0]
Range = 363.0
```

Confidence Interval for 99%

In [81]:
```
percent  = 99
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_age_17 = np.percentile(mean_0_17 , [left_interval , right_interval]).round
interval_age_25 = np.percentile(mean_18_25 , [left_interval , right_interval]).rour
interval_age_35 = np.percentile(mean_26_35 , [left_interval , right_interval]).rour
interval_age_45 = np.percentile(mean_36_45 , [left_interval , right_interval]).rour
interval_age_50 = np.percentile(mean_46_50 , [left_interval , right_interval]).rour
interval_age_55 = np.percentile(mean_51_55 , [left_interval , right_interval]).rour
interval_age_56 = np.percentile(mean_55 , [left_interval , right_interval]).round(0

print(f"99% Confidence Interval for people with age 0 - 17 and Sample Size 3000 is
print(f"Range = {interval_age_17[1] - interval_age_17[0]}")
print()
print(f"99% Confidence Interval for people with age 18 - 25 and Sample Size 3000 is
print(f"Range = {interval_age_25[1] - interval_age_25[0]}")
print()
print(f"99% Confidence Interval for people with age 26 - 35 and Sample Size 3000 is
print(f"Range = {interval_age_35[1] - interval_age_35[0]}")
print()
print(f"99% Confidence Interval for people with age 36 - 45 and Sample Size 3000 is
print(f"Range = {interval_age_45[1] - interval_age_45[0]}")
print()
print(f"99% Confidence Interval for people with age 46 - 50 and Sample Size 3000 is
print(f"Range = {interval_age_50[1] - interval_age_50[0]}")
print()
print(f"99% Confidence Interval for people with age 51 - 55 and Sample Size 3000 is
print(f"Range = {interval_age_55[1] - interval_age_55[0]}")
print()
print(f"99% Confidence Interval for people with age 55+ and Sample Size 3000 is [{i
print(f"Range = {interval_age_56[1] - interval_age_56[0]}")
```

```
99% Confidence Interval for people with age 0 - 17 and Sample Size 3000 is [8703.0
- 9172.0]
Range = 469.0

99% Confidence Interval for people with age 18 - 25 and Sample Size 3000 is [8936.
0 - 9401.0]
Range = 465.0

99% Confidence Interval for people with age 26 - 35 and Sample Size 3000 is [9033.
0 - 9492.0]
Range = 459.0

99% Confidence Interval for people with age 36 - 45 and Sample Size 3000 is [9091.
0 - 9571.0]
Range = 480.0

99% Confidence Interval for people with age 46 - 50 and Sample Size 3000 is [8973.
0 - 9448.0]
Range = 475.0

99% Confidence Interval for people with age 51 - 55 and Sample Size 3000 is [9293.
0 - 9783.0]
Range = 490.0

99% Confidence Interval for people with age 55+ and Sample Size 3000 is [9103.0 -
9574.0]
Range = 471.0
```

Sample Size = 30000

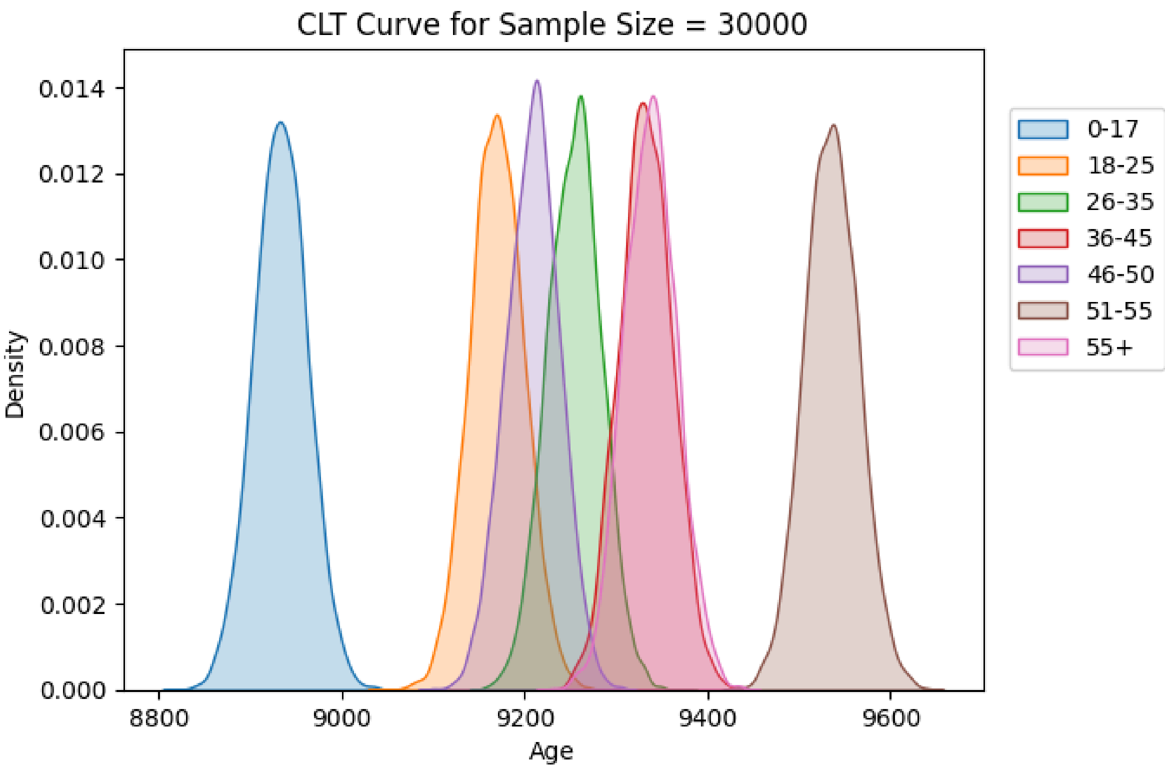
In [82]:
```
sample_size = 30000

mean_0_17 = []
mean_18_25 = []
mean_26_35 = []
mean_36_45 = []
mean_46_50 = []
mean_51_55 = []
mean_55 = []

for i in range(5000):
  sample_17 = np.random.choice(dt_0_17 , sample_size)
  sample_25 = np.random.choice(dt_18_25 , sample_size)
  sample_35 = np.random.choice(dt_26_35 , sample_size)
  sample_45 = np.random.choice(dt_36_45 , sample_size)
  sample_50 = np.random.choice(dt_46_50 , sample_size)
  sample_55 = np.random.choice(dt_51_55 , sample_size)
  sample_56 = np.random.choice(dt_55 , sample_size)

  sample_mean_17 = np.mean(sample_17)
  sample_mean_25 = np.mean(sample_25)
  sample_mean_35 = np.mean(sample_35)
  sample_mean_45 = np.mean(sample_45)
  sample_mean_50 = np.mean(sample_50)
  sample_mean_55 = np.mean(sample_55)
  sample_mean_56 = np.mean(sample_56)

  mean_0_17.append(sample_mean_17)
  mean_18_25.append(sample_mean_25)
  mean_26_35.append(sample_mean_35)
  mean_36_45.append(sample_mean_45)
  mean_46_50.append(sample_mean_50)
  mean_51_55.append(sample_mean_55)
  mean_55.append(sample_mean_56)

df_30000 = pd.DataFrame({"0-17" : mean_0_17 , "18-25" : mean_18_25 ,"26-35" : mean_
df_30000.head()
```

Out[82]:

	0-17	18-25	26-35	36-45	46-50	51-55	55+
0	8875.574767	9130.863267	9296.403633	9319.917600	9249.086000	9515.858267	9252.632300
1	8916.886067	9138.610233	9279.755033	9326.576400	9252.661733	9543.959833	9305.345633
2	8956.433267	9152.257200	9268.129733	9363.233333	9178.678933	9575.494500	9399.617233
3	8874.330600	9132.304133	9235.003700	9326.948033	9204.076500	9522.620967	9333.703067
4	8953.093733	9176.853567	9208.088800	9283.268200	9226.328100	9558.727867	9308.942000

In [83]:
```
sns.kdeplot(df_30000["0-17"] , fill = True , label = "0-17")
sns.kdeplot(df_30000["18-25"] , fill = True , label = "18-25")
sns.kdeplot(df_30000["26-35"] , fill = True , label = "26-35")
sns.kdeplot(df_30000["36-45"] , fill = True , label = "36-45")
sns.kdeplot(df_30000["46-50"] , fill = True , label = "46-50")
sns.kdeplot(df_30000["51-55"] , fill = True , label = "51-55")
sns.kdeplot(df_30000["55+"] , fill = True , label = "55+")
plt.legend(loc = (1.03 , 0.5))

plt.xlabel("Age")
```

```
plt.title("CLT Curve for Sample Size = 30000")
plt.show()
```



Confidence Interval for 90%

In [84]:
```
percent  = 90
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_age_17 = np.percentile(mean_0_17 , [left_interval , right_interval]).round
interval_age_25 = np.percentile(mean_18_25 , [left_interval , right_interval]).rour
interval_age_35 = np.percentile(mean_26_35 , [left_interval , right_interval]).rour
interval_age_45 = np.percentile(mean_36_45 , [left_interval , right_interval]).rour
interval_age_50 = np.percentile(mean_46_50 , [left_interval , right_interval]).rour
interval_age_55 = np.percentile(mean_51_55 , [left_interval , right_interval]).rour
interval_age_56 = np.percentile(mean_55 , [left_interval , right_interval]).round(

print(f"90% Confidence Interval for people with age 0 - 17 and Sample Size 30000 is
print(f"Range = {interval_age_17[1] - interval_age_17[0]}")
print()
print(f"90% Confidence Interval for people with age 18 - 25 and Sample Size 30000 i
print(f"Range = {interval_age_25[1] - interval_age_25[0]}")
print()
print(f"90% Confidence Interval for people with age 26 - 35 and Sample Size 30000 i
print(f"Range = {interval_age_35[1] - interval_age_35[0]}")
print()
print(f"90% Confidence Interval for people with age 36 - 45 and Sample Size 30000 i
print(f"Range = {interval_age_45[1] - interval_age_45[0]}")
print()
print(f"90% Confidence Interval for people with age 46 - 50 and Sample Size 30000 i
print(f"Range = {interval_age_50[1] - interval_age_50[0]}")
print()
print(f"90% Confidence Interval for people with age 51 - 55 and Sample Size 30000 i
print(f"Range = {interval_age_55[1] - interval_age_55[0]}")
print()
print(f"90% Confidence Interval for people with age 55+ and Sample Size 30000 is [{
print(f"Range = {interval_age_56[1] - interval_age_56[0]}")
```

```
90% Confidence Interval for people with age 0 - 17 and Sample Size 30000 is [8884.
0 - 8981.0]
Range = 97.0

90% Confidence Interval for people with age 18 - 25 and Sample Size 30000 is [912
2.0 - 9217.0]
Range = 95.0

90% Confidence Interval for people with age 26 - 35 and Sample Size 30000 is [920
5.0 - 9301.0]
Range = 96.0

90% Confidence Interval for people with age 36 - 45 and Sample Size 30000 is [928
5.0 - 9379.0]
Range = 94.0

90% Confidence Interval for people with age 46 - 50 and Sample Size 30000 is [915
9.0 - 9255.0]
Range = 96.0

90% Confidence Interval for people with age 51 - 55 and Sample Size 30000 is [948
7.0 - 9584.0]
Range = 97.0

90% Confidence Interval for people with age 55+ and Sample Size 30000 is [9290.0 -
9386.0]
Range = 96.0
```

Confidence Interval for 95%

In [85]:

```
percent  = 95
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_age_17 = np.percentile(mean_0_17 , [left_interval , right_interval]).round
interval_age_25 = np.percentile(mean_18_25 , [left_interval , right_interval]).rour
interval_age_35 = np.percentile(mean_26_35 , [left_interval , right_interval]).rour
interval_age_45 = np.percentile(mean_36_45 , [left_interval , right_interval]).rour
interval_age_50 = np.percentile(mean_46_50 , [left_interval , right_interval]).rour
interval_age_55 = np.percentile(mean_51_55 , [left_interval , right_interval]).rour
interval_age_56 = np.percentile(mean_55 , [left_interval , right_interval]).round(

print(f"95% Confidence Interval for people with age 0 - 17 and Sample Size 30000 is
print(f"Range = {interval_age_17[1] - interval_age_17[0]}")
print()
print(f"95% Confidence Interval for people with age 18 - 25 and Sample Size 30000 i
print(f"Range = {interval_age_25[1] - interval_age_25[0]}")
print()
print(f"95% Confidence Interval for people with age 26 - 35 and Sample Size 30000 i
print(f"Range = {interval_age_35[1] - interval_age_35[0]}")
print()
print(f"95% Confidence Interval for people with age 36 - 45 and Sample Size 30000 i
print(f"Range = {interval_age_45[1] - interval_age_45[0]}")
print()
print(f"95% Confidence Interval for people with age 46 - 50 and Sample Size 30000 i
print(f"Range = {interval_age_50[1] - interval_age_50[0]}")
print()
print(f"95% Confidence Interval for people with age 51 - 55 and Sample Size 30000 i
print(f"Range = {interval_age_55[1] - interval_age_55[0]}")
print()
print(f"95% Confidence Interval for people with age 55+ and Sample Size 30000 is [{
print(f"Range = {interval_age_56[1] - interval_age_56[0]}")
```

```
95% Confidence Interval for people with age 0 - 17 and Sample Size 30000 is [8875.
0 - 8992.0]
Range = 117.0

95% Confidence Interval for people with age 18 - 25 and Sample Size 30000 is [911
2.0 - 9227.0]
Range = 115.0

95% Confidence Interval for people with age 26 - 35 and Sample Size 30000 is [919
7.0 - 9311.0]
Range = 114.0

95% Confidence Interval for people with age 36 - 45 and Sample Size 30000 is [927
6.0 - 9387.0]
Range = 111.0

95% Confidence Interval for people with age 46 - 50 and Sample Size 30000 is [915
1.0 - 9264.0]
Range = 113.0

95% Confidence Interval for people with age 51 - 55 and Sample Size 30000 is [947
8.0 - 9594.0]
Range = 116.0

95% Confidence Interval for people with age 55+ and Sample Size 30000 is [9282.0 -
9395.0]
Range = 113.0
```

Confidence Interval for 99%

In [86]:

```python
percent  = 99
left_interval = (100 - percent)/2
right_interval = (100 + percent)/2

interval_age_17 = np.percentile(mean_0_17 , [left_interval , right_interval]).round
interval_age_25 = np.percentile(mean_18_25 , [left_interval , right_interval]).rour
interval_age_35 = np.percentile(mean_26_35 , [left_interval , right_interval]).rour
interval_age_45 = np.percentile(mean_36_45 , [left_interval , right_interval]).rour
interval_age_50 = np.percentile(mean_46_50 , [left_interval , right_interval]).rour
interval_age_55 = np.percentile(mean_51_55 , [left_interval , right_interval]).rour
interval_age_56 = np.percentile(mean_55 , [left_interval , right_interval]).round(

print(f"99% Confidence Interval for people with age 0 - 17 and Sample Size 30000 is
print(f"Range = {interval_age_17[1] - interval_age_17[0]}")
print()
print(f"99% Confidence Interval for people with age 18 - 25 and Sample Size 30000 i
print(f"Range = {interval_age_25[1] - interval_age_25[0]}")
print()
print(f"99% Confidence Interval for people with age 26 - 35 and Sample Size 30000 i
print(f"Range = {interval_age_35[1] - interval_age_35[0]}")
print()
print(f"99% Confidence Interval for people with age 36 - 45 and Sample Size 30000 i
print(f"Range = {interval_age_45[1] - interval_age_45[0]}")
print()
print(f"99% Confidence Interval for people with age 46 - 50 and Sample Size 30000 i
print(f"Range = {interval_age_50[1] - interval_age_50[0]}")
print()
print(f"99% Confidence Interval for people with age 51 - 55 and Sample Size 30000 i
print(f"Range = {interval_age_55[1] - interval_age_55[0]}")
print()
print(f"99% Confidence Interval for people with age 55+ and Sample Size 30000 is [{
print(f"Range = {interval_age_56[1] - interval_age_56[0]}")
```

```
99% Confidence Interval for people with age 0 - 17 and Sample Size 30000 is [8859.
0 - 9009.0]
Range = 150.0

99% Confidence Interval for people with age 18 - 25 and Sample Size 30000 is [909
5.0 - 9245.0]
Range = 150.0

99% Confidence Interval for people with age 26 - 35 and Sample Size 30000 is [917
8.0 - 9329.0]
Range = 151.0

99% Confidence Interval for people with age 36 - 45 and Sample Size 30000 is [925
8.0 - 9405.0]
Range = 147.0

99% Confidence Interval for people with age 46 - 50 and Sample Size 30000 is [913
6.0 - 9280.0]
Range = 144.0

99% Confidence Interval for people with age 51 - 55 and Sample Size 30000 is [945
9.0 - 9614.0]
Range = 155.0

99% Confidence Interval for people with age 55+ and Sample Size 30000 is [9259.0 -
9412.0]
Range = 153.0
```

Insight :

- As the size of the sample increases the confidence interval is becoming more clear and accurate. Hence, more the sample size more precise is the data.
- From the above graphs its clear that some age groups have overlapping CLT curve whereas some dont.
  - Age 0 - 17 had the least spending.
  - Age 18 - 25, 26 - 35, 46 - 50 have almost the same overlapping curve hence they have almost similar purchase characteristics.
  - Age 36 - 45, 55+ have a overlapping curve thereby indicating that they have a very similar purchase characteristics.
  - Age 51 - 55 has the highest purchase among all the other age groups.

Recommendations :

- As Male customers contributed to majority if the sale compare to Female , Walmart should provide offers in a way which retains the Male customers as well concentrate in increasing the female customers too.
- The customers in age group 0 - 17 had very less purchase hence Walmart can provide more coupon , sales and offers on the suited products to increase the purchase.
- Walmart can offer pre sales or more offers to the products preferred by the age group 51 - 55 as they had the maximum amount per purchase.

- The product categories 5, 1, 8 are sold the most hence Walmart can have huge stock of products from these categories to avoid late deliveries or other related issues.
- Post sale Walmart can provide deals or cupons and send emails regarding the existing deals or offers to attract the customers thereby having them intact.

In [ ]:

```

```