This Analysis about Telco Customer Churn

importing some important libarares

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

load the file

In [2]:
```
dataFrame = pd.read_csv('telco_churn.csv')
```

Take idea about data

In [92]:
```
print(dataFrame.head())
```

```
   gender  SeniorCitizen Partner Dependents  tenure PhoneService  \
0  Female              0     Yes         No       1           No
1    Male              0      No         No      34          Yes
2    Male              0      No         No       2          Yes
3    Male              0      No         No      45           No
4  Female              0      No         No       2          Yes

      MultipleLines InternetService OnlineSecurity OnlineBackup  ...  \
0  No phone service             DSL             No          Yes  ...
1                No             DSL            Yes           No  ...
2                No             DSL            Yes          Yes  ...
3  No phone service             DSL            Yes           No  ...
4                No     Fiber optic             No           No  ...

  StreamingMovies        Contract PaperlessBilling              PaymentMethod  \
0              No  Month-to-month              Yes           Electronic check
1              No        One year               No               Mailed check
2              No  Month-to-month              Yes               Mailed check
3              No        One year               No  Bank transfer (automatic)
4              No  Month-to-month              Yes           Electronic check

  MonthlyCharges TotalCharges Churn   TenureGroup  TotalRevenue ChurnBinary
0          29.85        29.85    No   0-12 months         29.85           0
1          56.95      1889.50    No  24-36 months       1936.30           0
2          53.85       108.15   Yes   0-12 months        107.70           1
3          42.30      1840.75    No  36-48 months       1903.50           0
4          70.70       151.65   Yes   0-12 months        141.40           1

[5 rows x 23 columns]
```

In [5]:
```
print(dataFrame.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7043 entries, 0 to 7042
Data columns (total 21 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   customerID        7043 non-null   object 
 1   gender            7043 non-null   object 
 2   SeniorCitizen     7043 non-null   int64  
 3   Partner           7043 non-null   object 
 4   Dependents        7043 non-null   object 
 5   tenure            7043 non-null   int64  
 6   PhoneService      7043 non-null   object 
 7   MultipleLines     7043 non-null   object 
 8   InternetService   7043 non-null   object 
 9   OnlineSecurity    7043 non-null   object 
 10  OnlineBackup      7043 non-null   object 
 11  DeviceProtection  7043 non-null   object 
 12  TechSupport       7043 non-null   object 
 13  StreamingTV       7043 non-null   object 
 14  StreamingMovies   7043 non-null   object 
 15  Contract          7043 non-null   object 
 16  PaperlessBilling  7043 non-null   object 
 17  PaymentMethod     7043 non-null   object 
 18  MonthlyCharges    7043 non-null   float64
 19  TotalCharges      7043 non-null   object 
 20  Churn             7043 non-null   object 
dtypes: float64(1), int64(2), object(18)
memory usage: 1.1+ MB
None
```

In [6]:
```
print(dataFrame.describe())
```

```
       SeniorCitizen       tenure  MonthlyCharges
count    7043.000000  7043.000000     7043.000000
mean        0.162147    32.371149       64.761692
std         0.368612    24.559481       30.090047
min         0.000000     0.000000       18.250000
25%         0.000000     9.000000       35.500000
50%         0.000000    29.000000       70.350000
75%         0.000000    55.000000       89.850000
max         1.000000    72.000000      118.750000
```

Cleaning Data Phase

ensure if there is missiing values

In [4]:
```
print(dataFrame.isnull().sum())
```

```
customerID          0
gender              0
SeniorCitizen       0
Partner             0
Dependents          0
tenure              0
PhoneService        0
MultipleLines       0
InternetService     0
OnlineSecurity      0
OnlineBackup        0
DeviceProtection    0
TechSupport         0
StreamingTV         0
StreamingMovies     0
Contract            0
PaperlessBilling    0
PaymentMethod       0
MonthlyCharges      0
TotalCharges        0
Churn               0
dtype: int64
```

Drop Customer ID column because is not matter

In [7]:
```
dataFrame.drop(columns=['customerID'], inplace=True)
```

Change Total Charges column values to numeric values to use it in analysis

In [10]:
```
dataFrame['TotalCharges'] = pd.to_numeric(dataFrame['TotalCharges'], errors='coerce')
```

Check if there duplicated rows

In [15]:
```
dataFrame.duplicated().sum()
```

Out[15]: 22

Drop duplicates rows

In [18]:
```
dataFrame.drop_duplicates(inplace=True)
```

Drop rows that have null values

In [12]:
```
dataFrame.dropna(inplace=True)
```

Save the cleaned file

In [13]:
```
dataFrame.to_csv('telc_churn_cleaned.csv',index=False)
```

Second Phase

EDA Phase

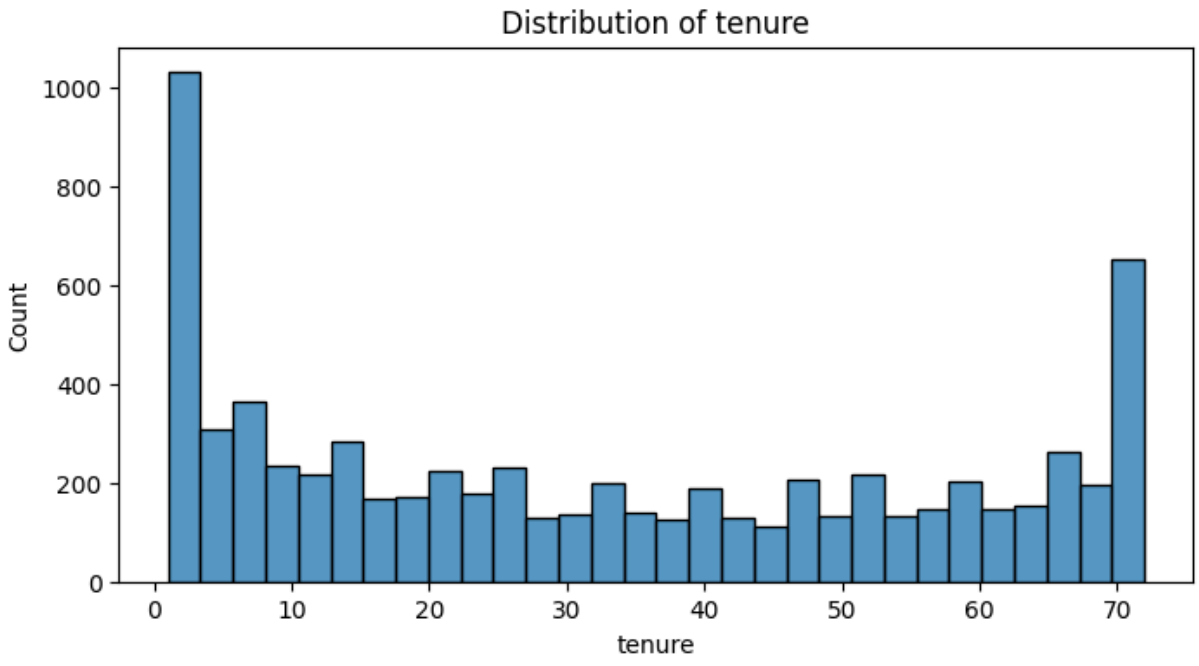
load cleaned csv

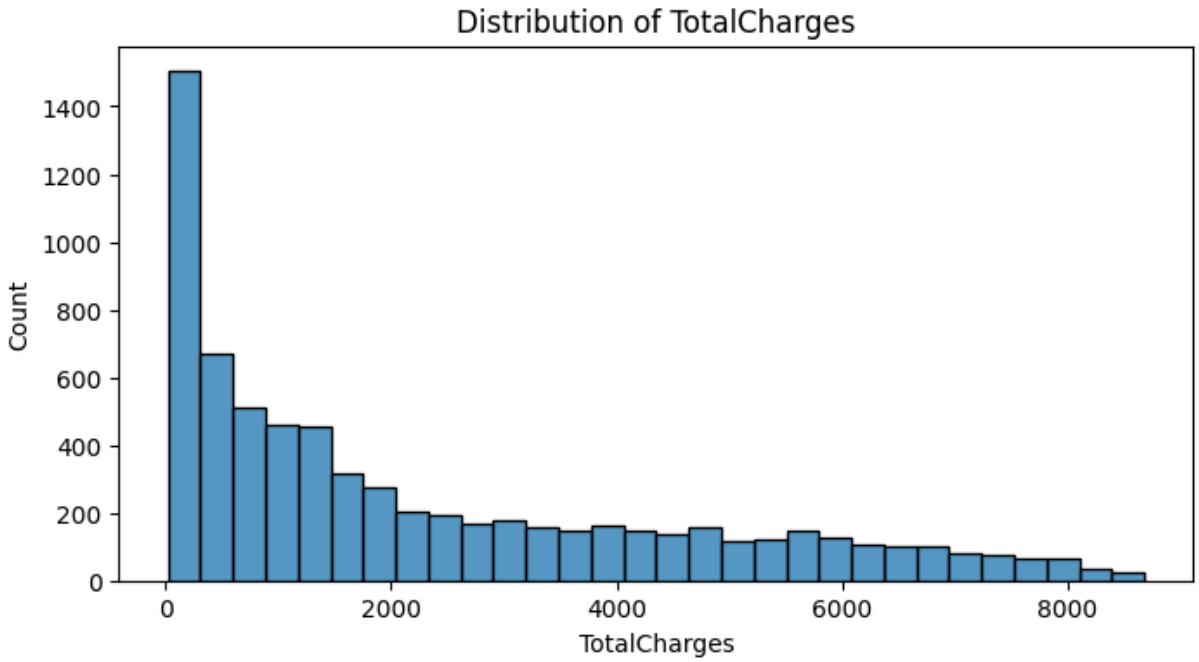
In [96]:
```
dataFrame = pd.read_csv('telc_churn_cleaned.csv')
```

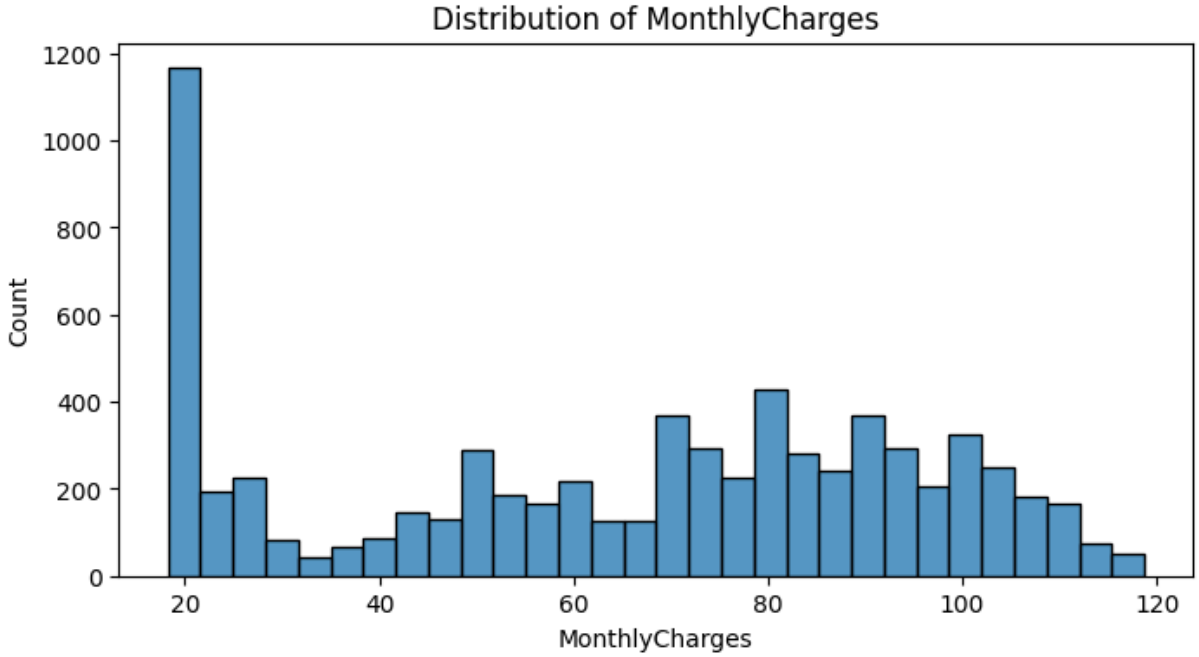
Univariate

Generate visulaization to numeric columns to see Distribution

In [24]:
```
numerical_columns = ['tenure','TotalCharges','MonthlyCharges']
for col in numerical_columns:
    plt.figure(figsize=(8,4))
    sns.histplot(dataFrame[col], kde= False , bins = 30)
    plt.title(f'Distribution of {col}')
    plt.show()
```







Notes :

in tenure plot (histogram) we see little tenure is i a lot

in Total charge plot (histogram) we see little total charges is more

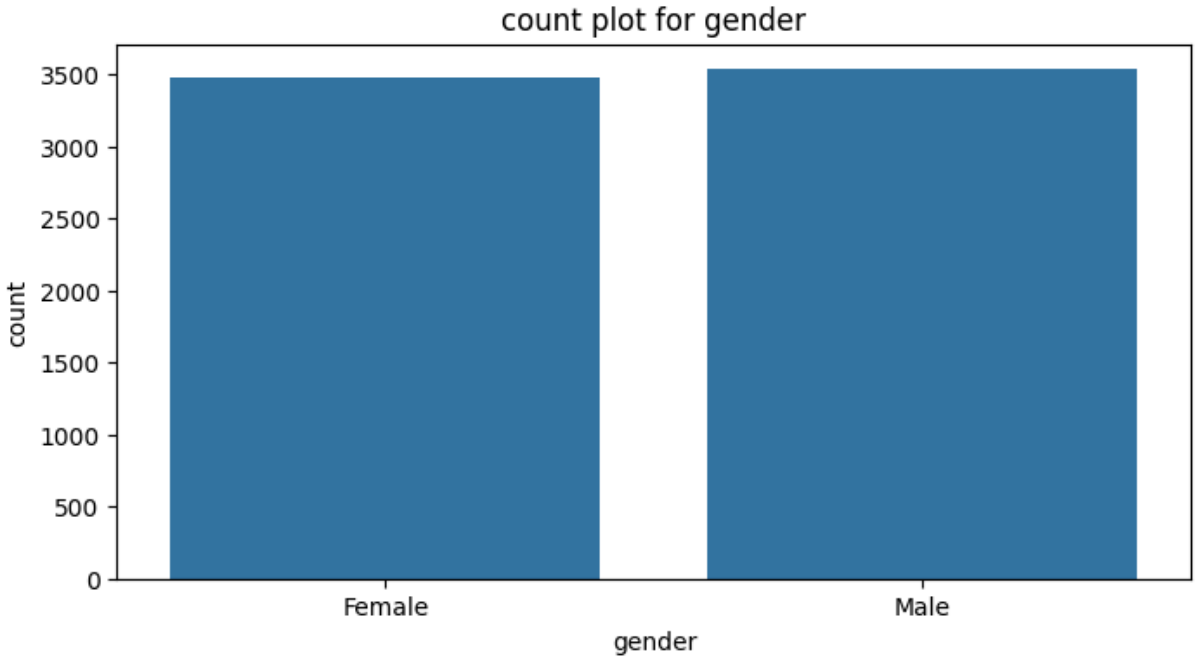
in monthly charge plot (histogram) we see high monthly charges is more

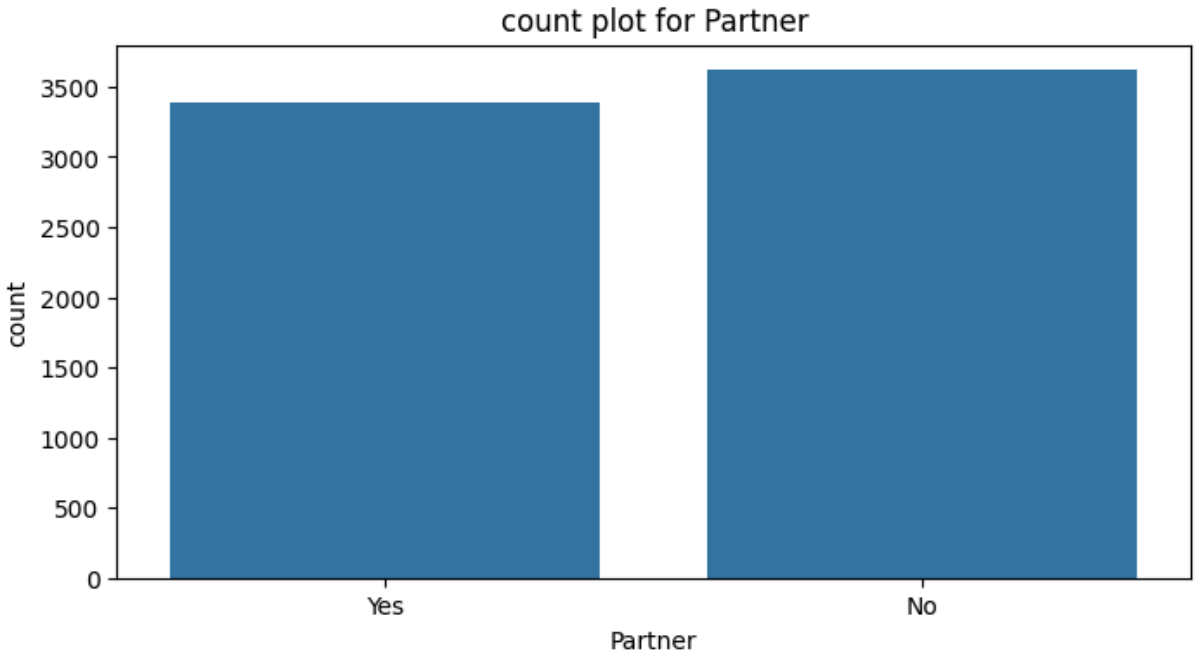
there is relate between high monthly charges and little tenure

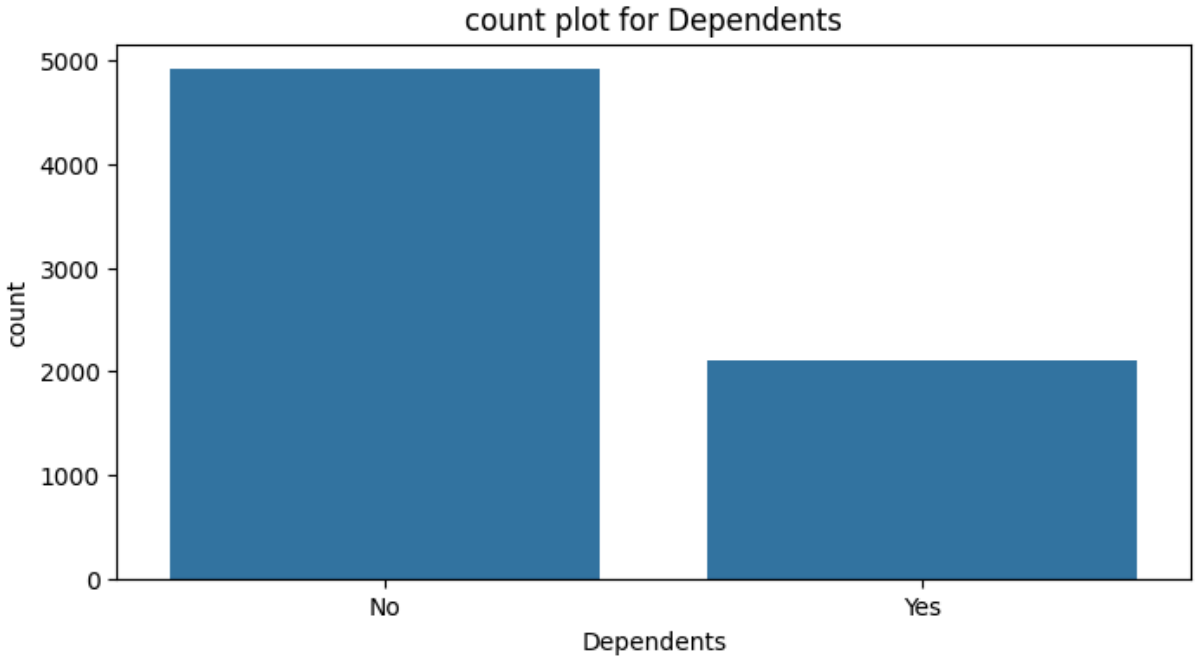
Bivariate

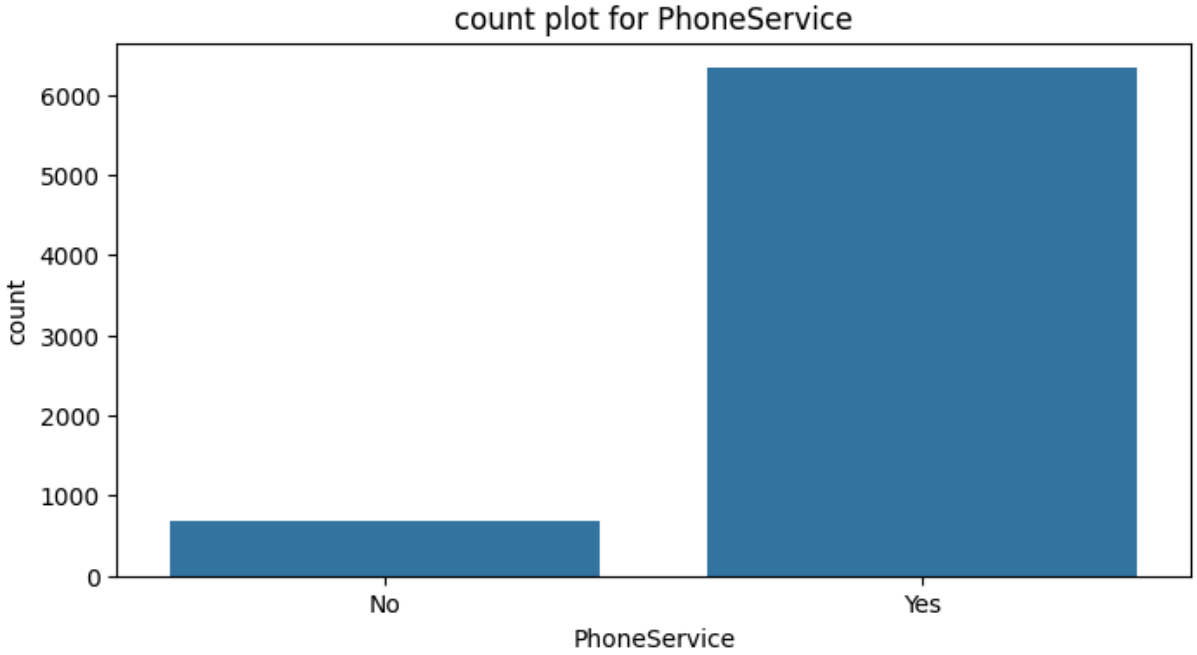
Generate visulaization to categorical columns to see counts

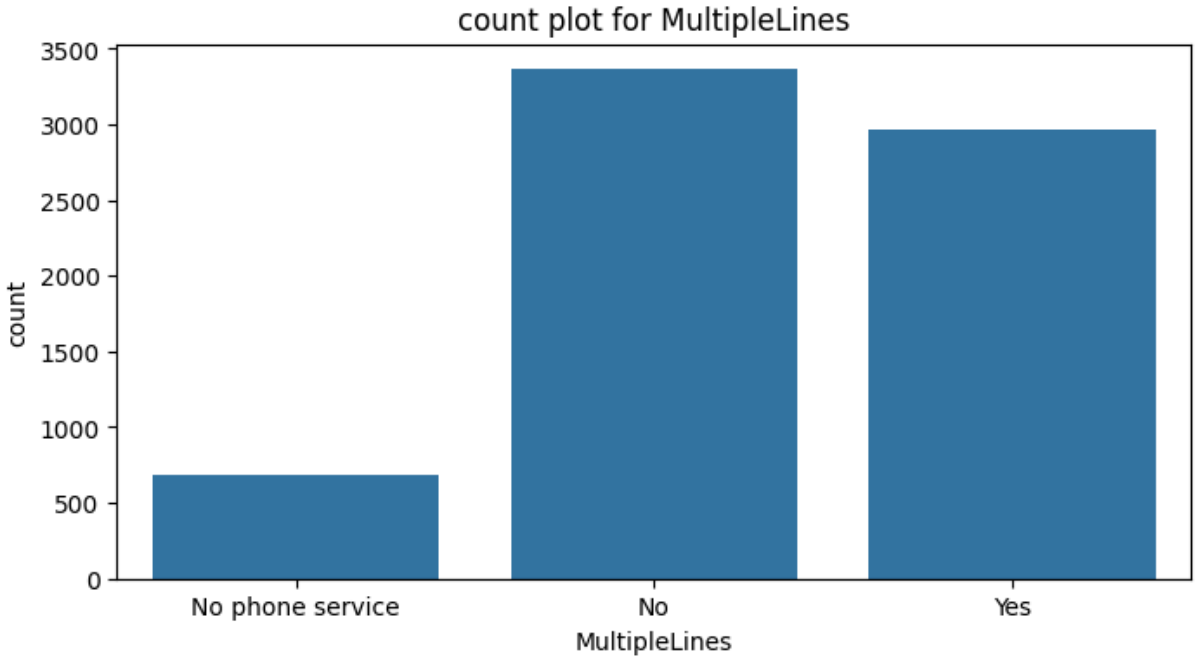
In [33]:
```
categorical_columns = ['gender', 'Partner', 'Dependents', 'PhoneService',
                       'MultipleLines', 'InternetService', 'Churn',
                       'PaymentMethod', 'Contract']
for col in categorical_columns:
    plt.figure(figsize=(8,4))
    sns.countplot(x=dataFrame[col])
    plt.title(f'count plot for {col}')
    plt.show()
```

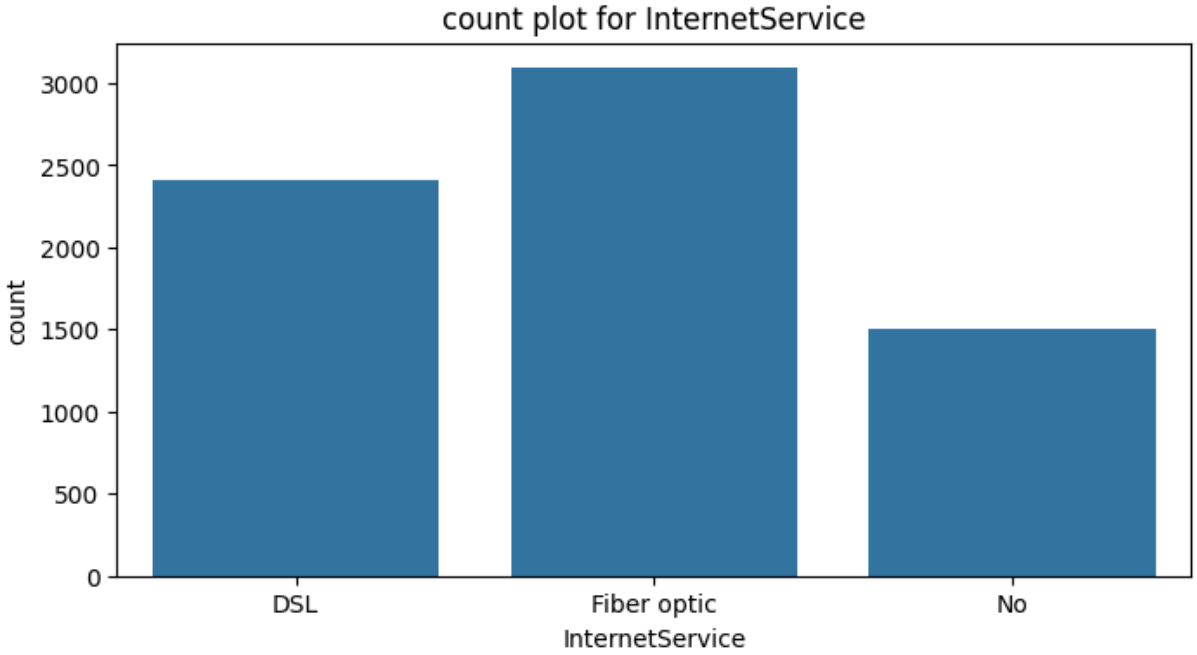


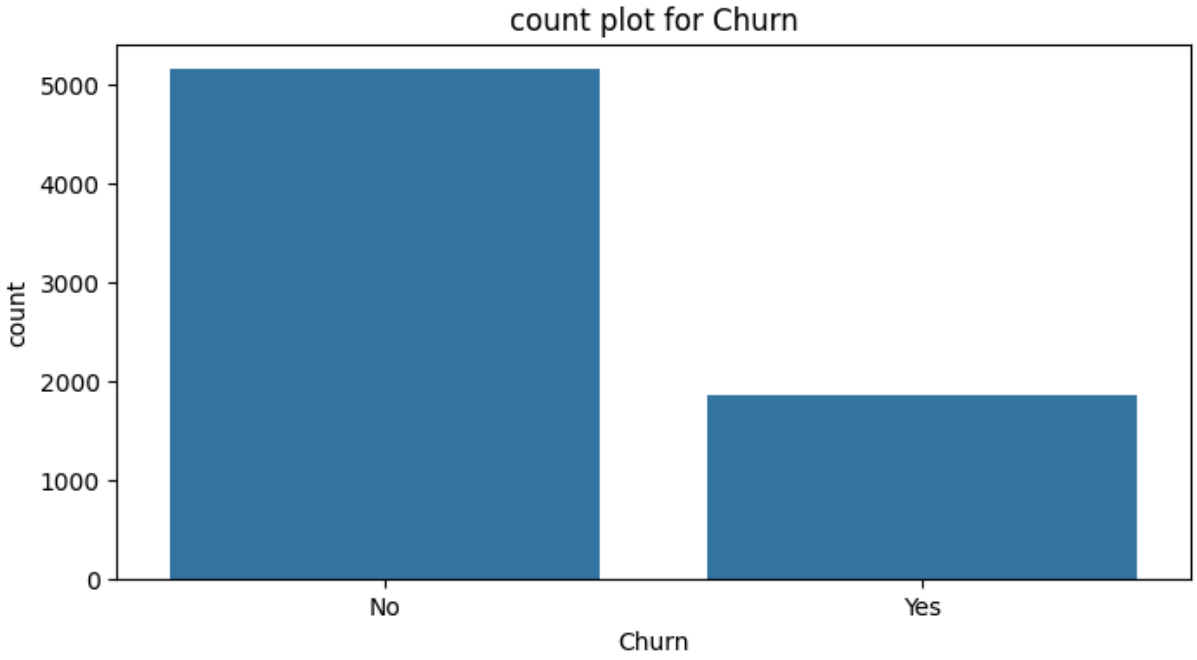


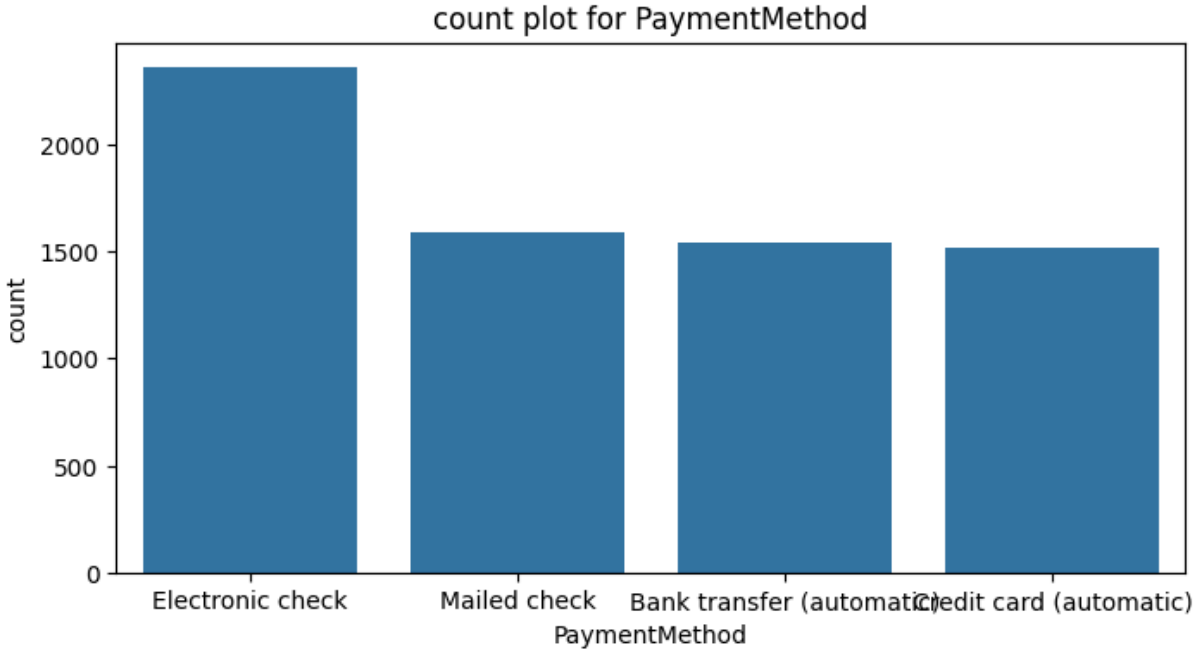

count plot for Dependents
5000
4000
3000
2000
1000
0
count
No
Yes
Dependents

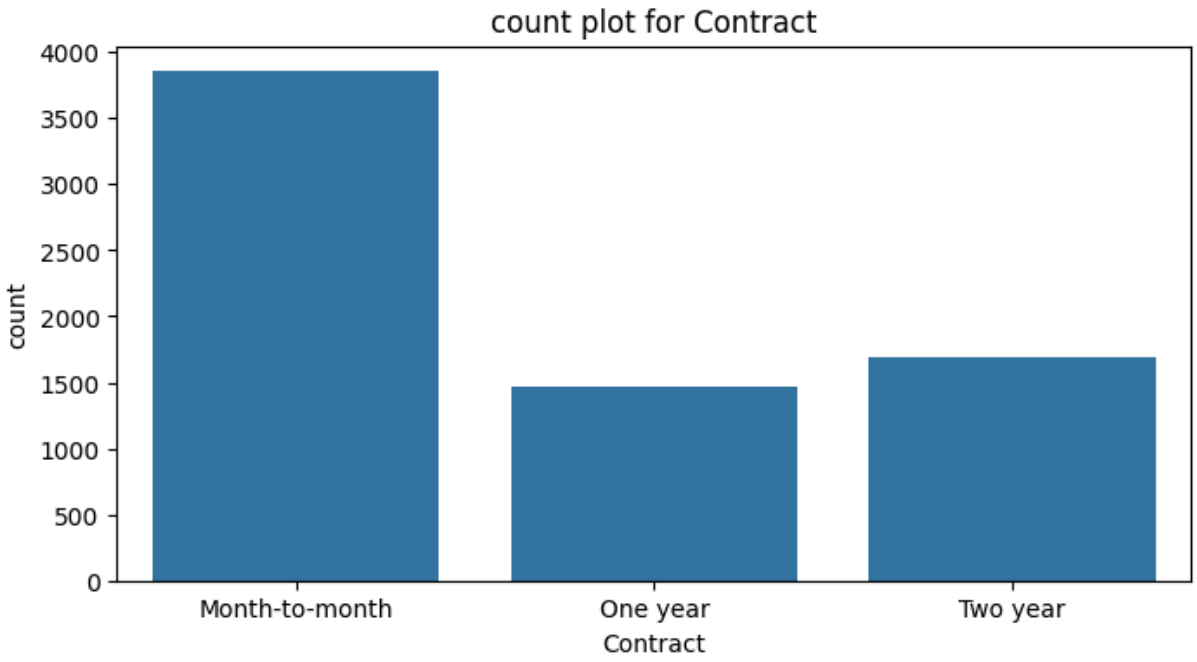

count plot for PhoneService
6000
5000
4000
3000
2000
1000
0
count
No
Yes
PhoneService


count plot for MultipleLines
3500
3000
2500
2000
1500
1000
500
0
count
No phone service
No
Yes
MultipleLines


count plot for InternetService
3000
2500
2000
1500
1000
500
0
count
DSL
Fiber optic
No
InternetService


count plot for Churn
count
5000
4000
3000
2000
1000
0
No
Yes
Churn


count plot for PaymentMethod
count
2000
1500
1000
500
0
Electronic check
Mailed check
Bank transfer (automatic)
Credit card (automatic)
PaymentMethod



Notes :

in gender plot we see equlity in both

in Partner plot we see the people that not partner is little bit more that partners

in Dependets plot we see people have dependets little than who dont have dependets

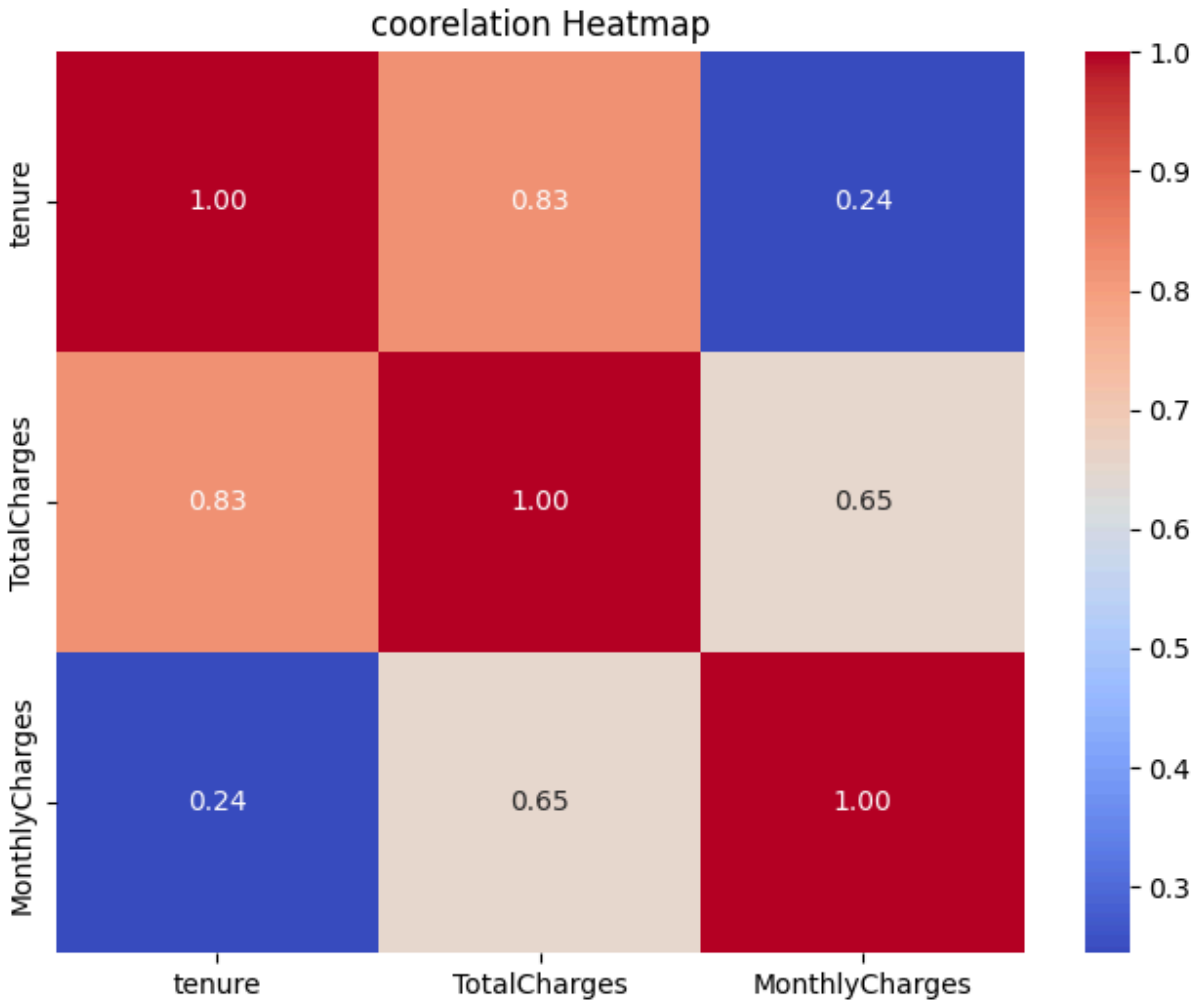
in internet services plot we see people that use fiber optic more than those use dls and dls more than those dont use any service

in contract plot we see people use month to month contrack more the one year contrackt

Visualize Correlation

Generate visulaization to relation ship between multi columns

In [37]:
```
plt.figure(figsize=(8,6))
sns.heatmap(dataFrame[numerical_columns].corr(),annot=True,cmap= 'coolwarm',fmt='.2f'
plt.title('coorelation Heatmap')
plt.show()
```



Notes :

you can see monthly charges and tenure little relation

More EDA

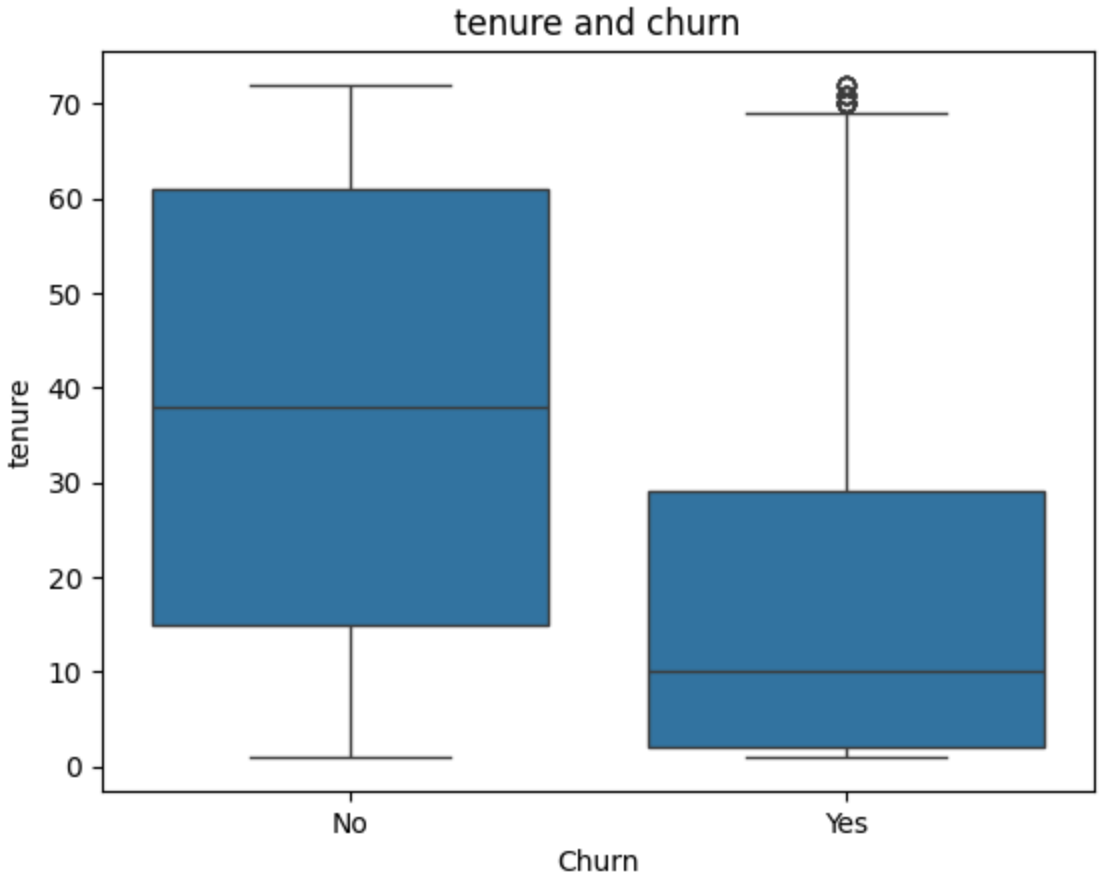
Extract percentage of churn customers

In [95]:
```
churn_distribution = dataFrame['Churn'].value_counts()
print(f"Percentage of churn customers: {churn_distribution['Yes'] / len(dataFrame2) *
```

```
Percentage of churn customers: 26.58%
```

Generate plot that show us the tenure and churn related

In [55]:
```
sns.boxplot(x='Churn', y='tenure' , data = dataFrame2)
plt.title('tenure and churn')
plt.show()
```

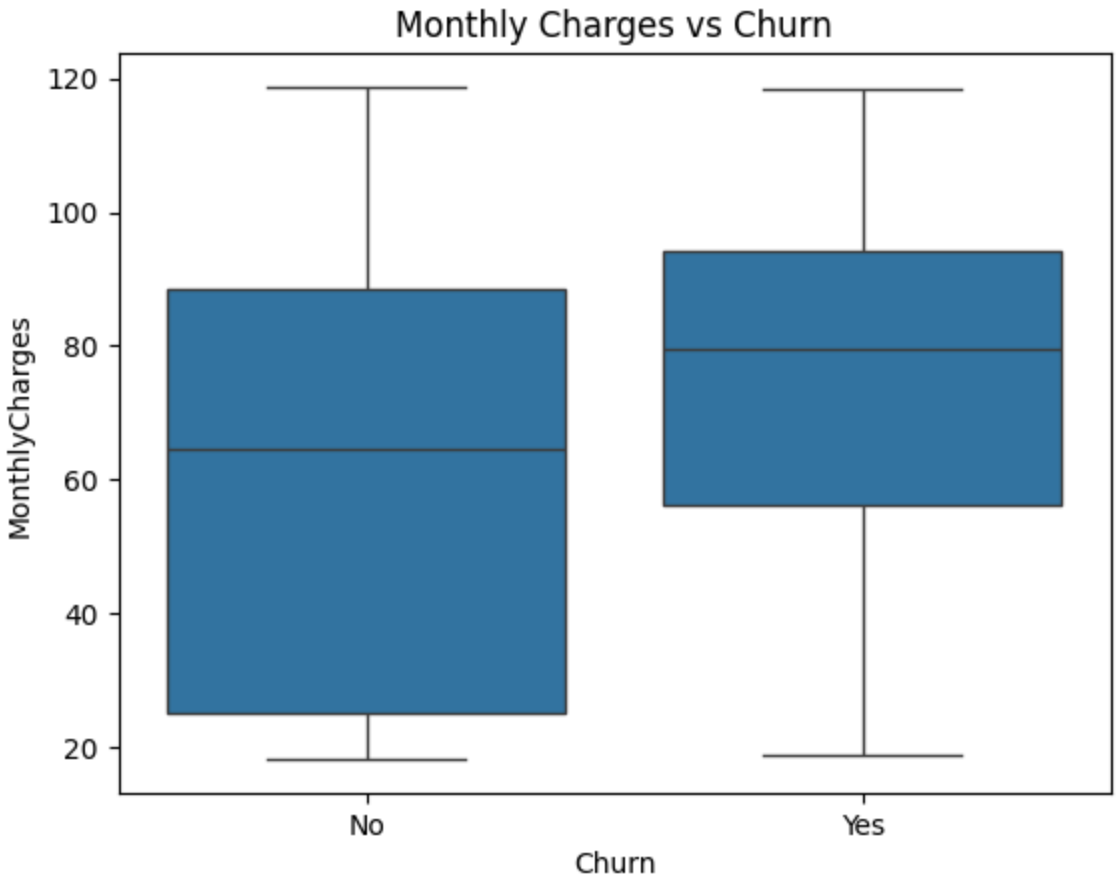


Notes:

we see the more customers churn in little tenure

Generate plot that show us the monthly chargeand churn related

In [57]:
```
sns.boxplot(x='Churn', y='MonthlyCharges', data=dataFrame2)
plt.title('Monthly Charges vs Churn')
plt.show()
```

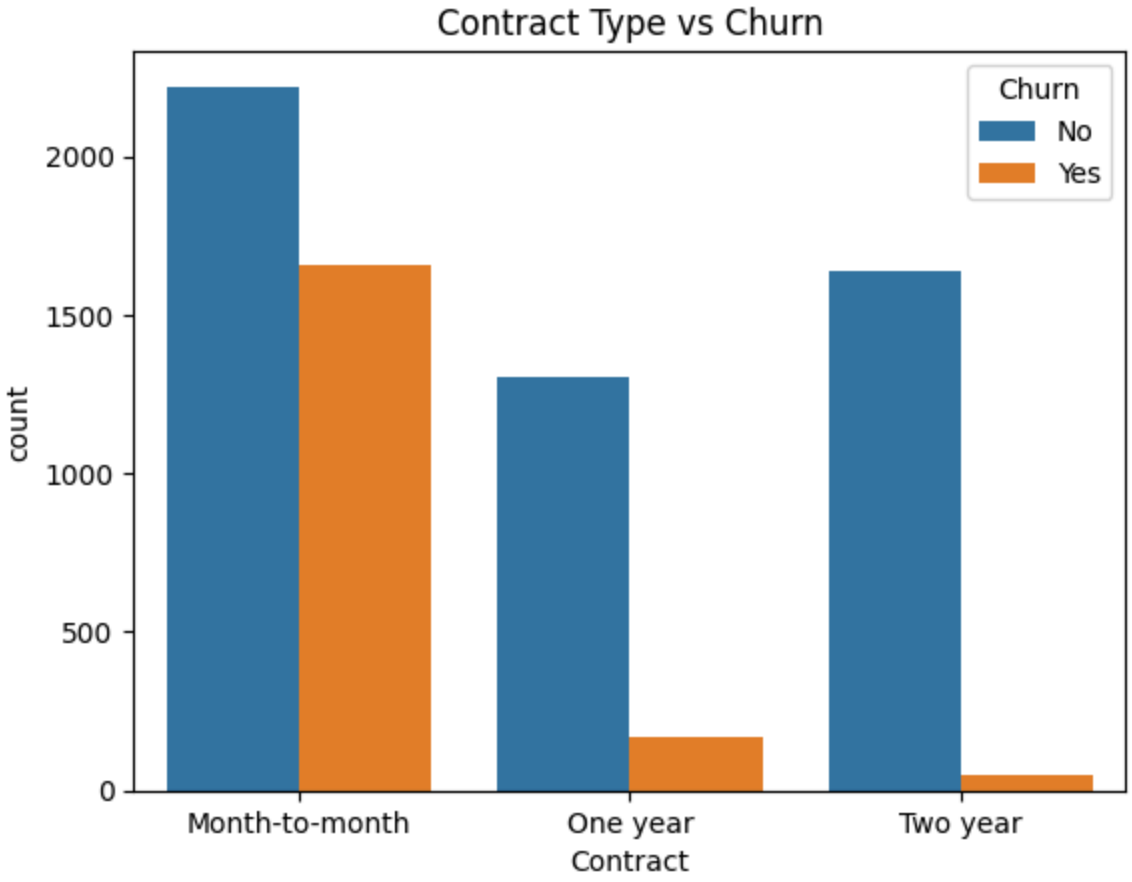


Notes:

we see the more customers churn in high monthly charge

Generate plot that show us the contract and churn related

In [59]:
```
sns.countplot(x='Contract', hue='Churn', data=dataFrame2)
plt.title('Contract Type vs Churn')
plt.show()
```



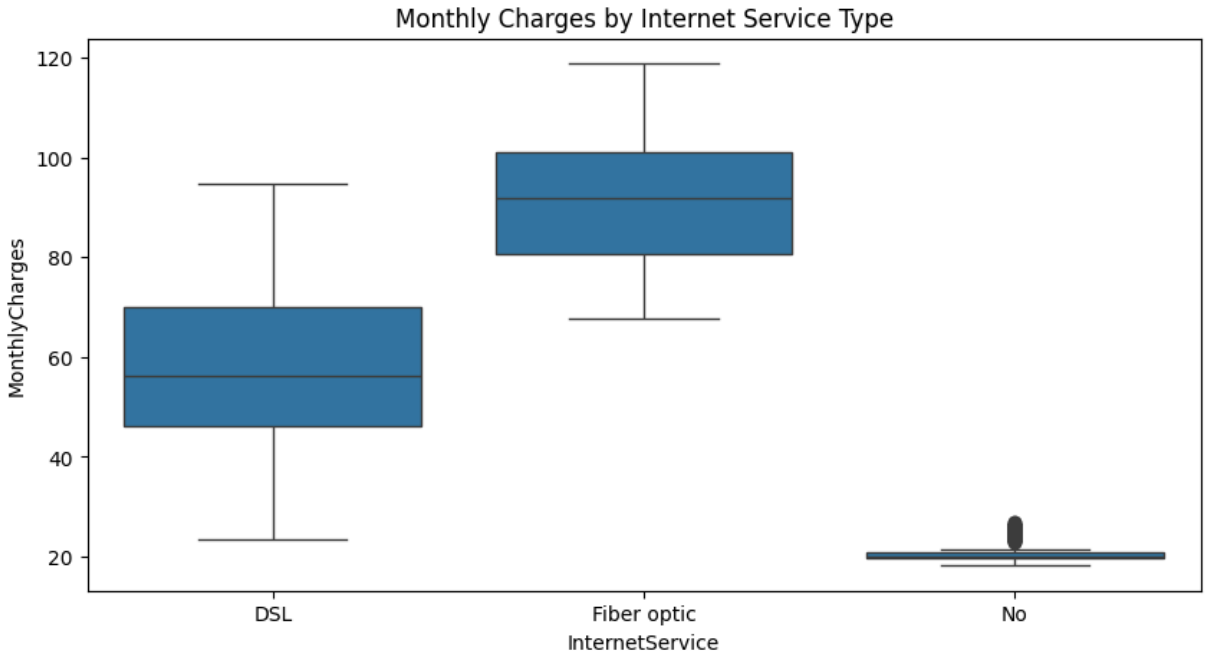
Notes:

we see the more customers churn in they uses month to mounnt contract

improve insight

Generate plot that show us the monthly charges and internet service tupe related

In [76]:
```
plt.figure(figsize=(10, 5))
sns.boxplot(x=dataFrame["InternetService"], y=dataFrame["MonthlyCharges"])
plt.title("Monthly Charges by Internet Service Type")
plt.show()
```

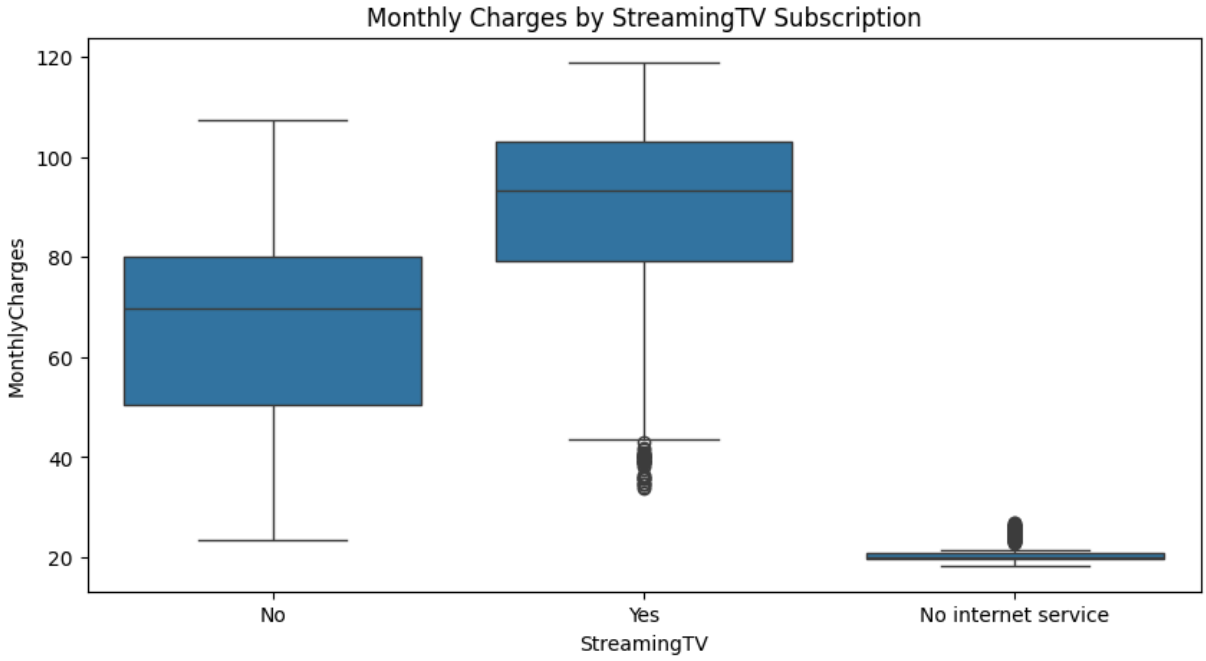


Notes:

we see the more higly monthly charge is about customers use fiber optic intenr service

Generate plot that show us the high monthly charges and streaming tv

In [78]:
```
plt.figure(figsize=(10, 5))
sns.boxplot(x=dataFrame["StreamingTV"], y=dataFrame["MonthlyCharges"])
plt.title("Monthly Charges by StreamingTV Subscription")
plt.show()
```



Notes:

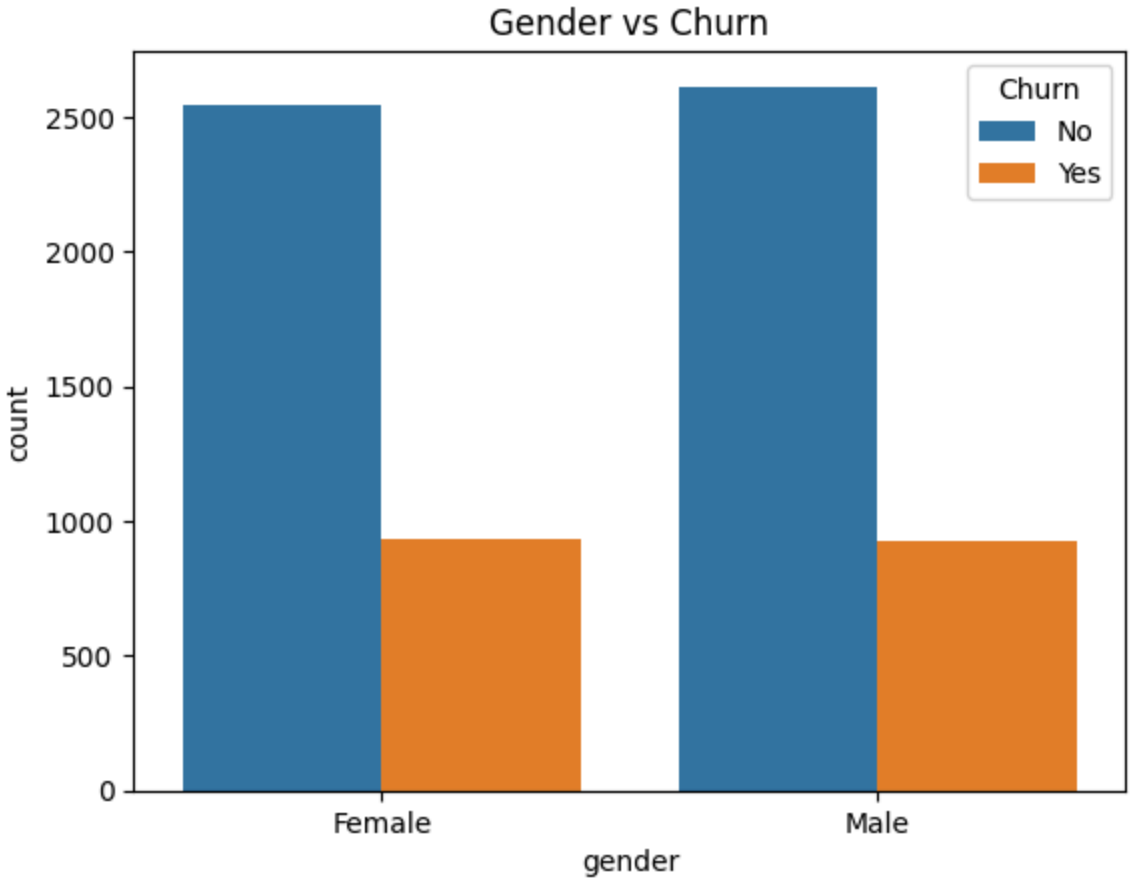
we see the more higly monthly charge is about customers subscribe to streaming tv

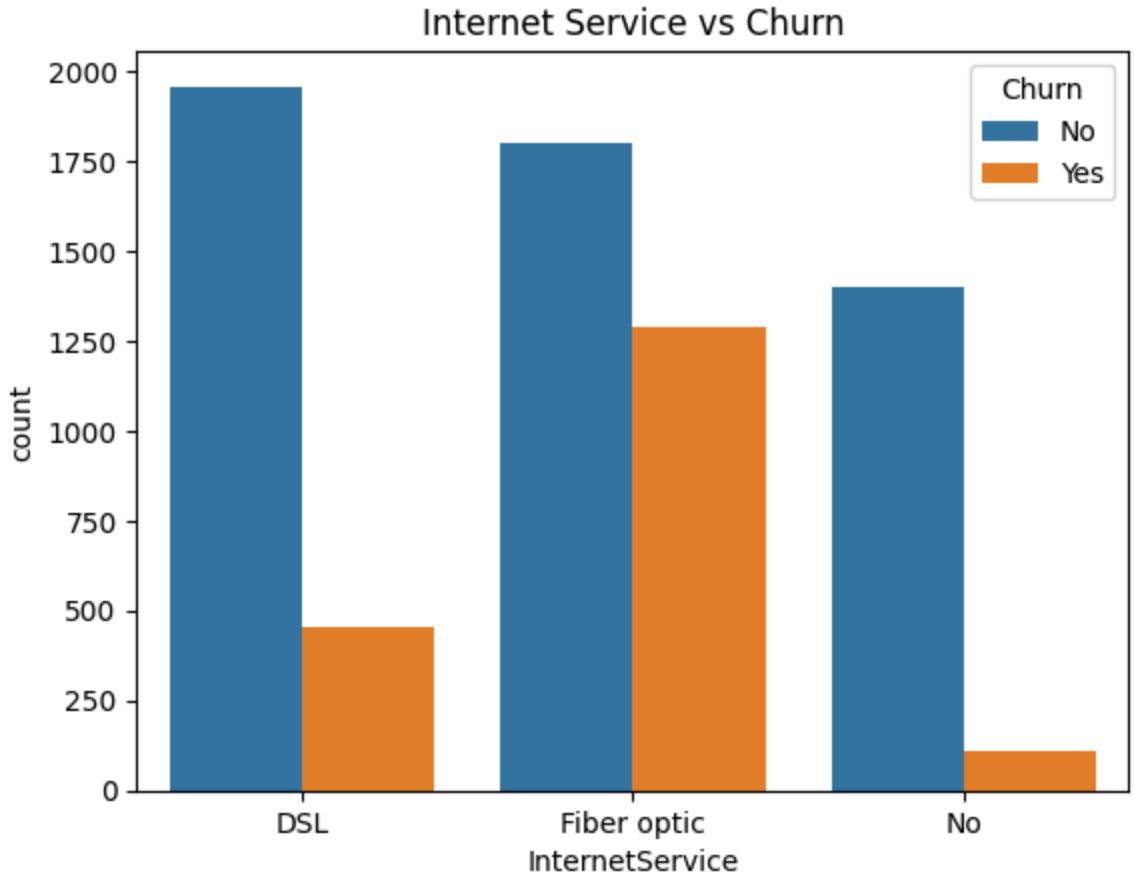
Generate plot that show us churn and other categorical things

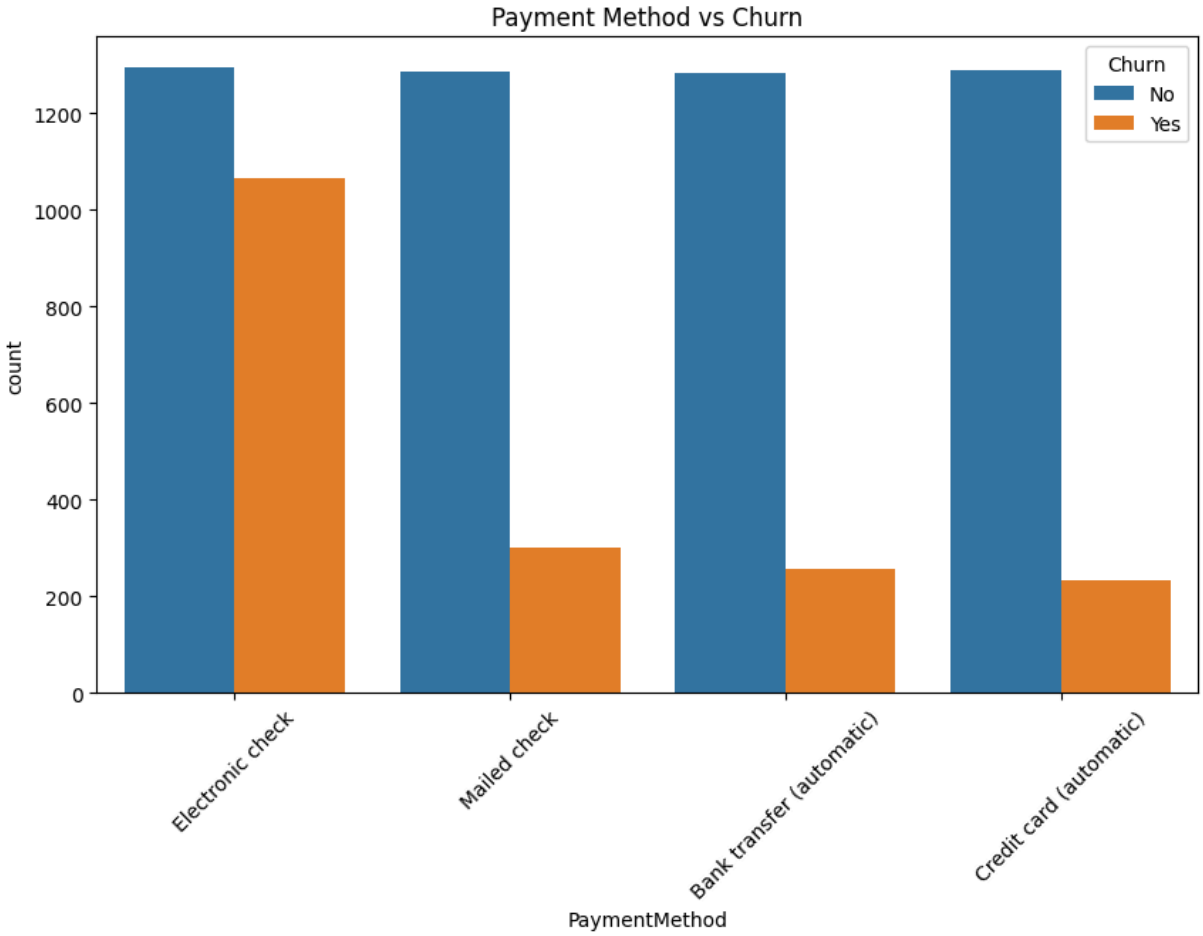
In [80]:
```
sns.countplot(x='gender', hue='Churn', data=dataFrame)
plt.title('Gender vs Churn')
plt.show()

# Internet Service vs Churn
sns.countplot(x='InternetService', hue='Churn', data=dataFrame)
plt.title('Internet Service vs Churn')
plt.show()

# Payment Method vs Churn
plt.figure(figsize=(10, 6))
sns.countplot(x='PaymentMethod', hue='Churn', data=dataFrame)
plt.title('Payment Method vs Churn')
plt.xticks(rotation=45)
plt.show()
```




Internet Service vs Churn
Churn
No
Yes
count
2000
1750
1500
1250
1000
750
500
250
0
DSL
Fiber optic
No
InternetService


Payment Method vs Churn
Churn
No
Yes
count
1200
1000
800
600
400
200
0
Electronic check
Mailed check
Bank transfer (automatic)
Credit card (automatic)
PaymentMethod

Notes:

we see the the churn customers gender is same between female and male

we see the the churn customers and intenet service that one uses fiber optic that more churn

we see the the churn customers and payment methode that one pay by electonic check si more churn

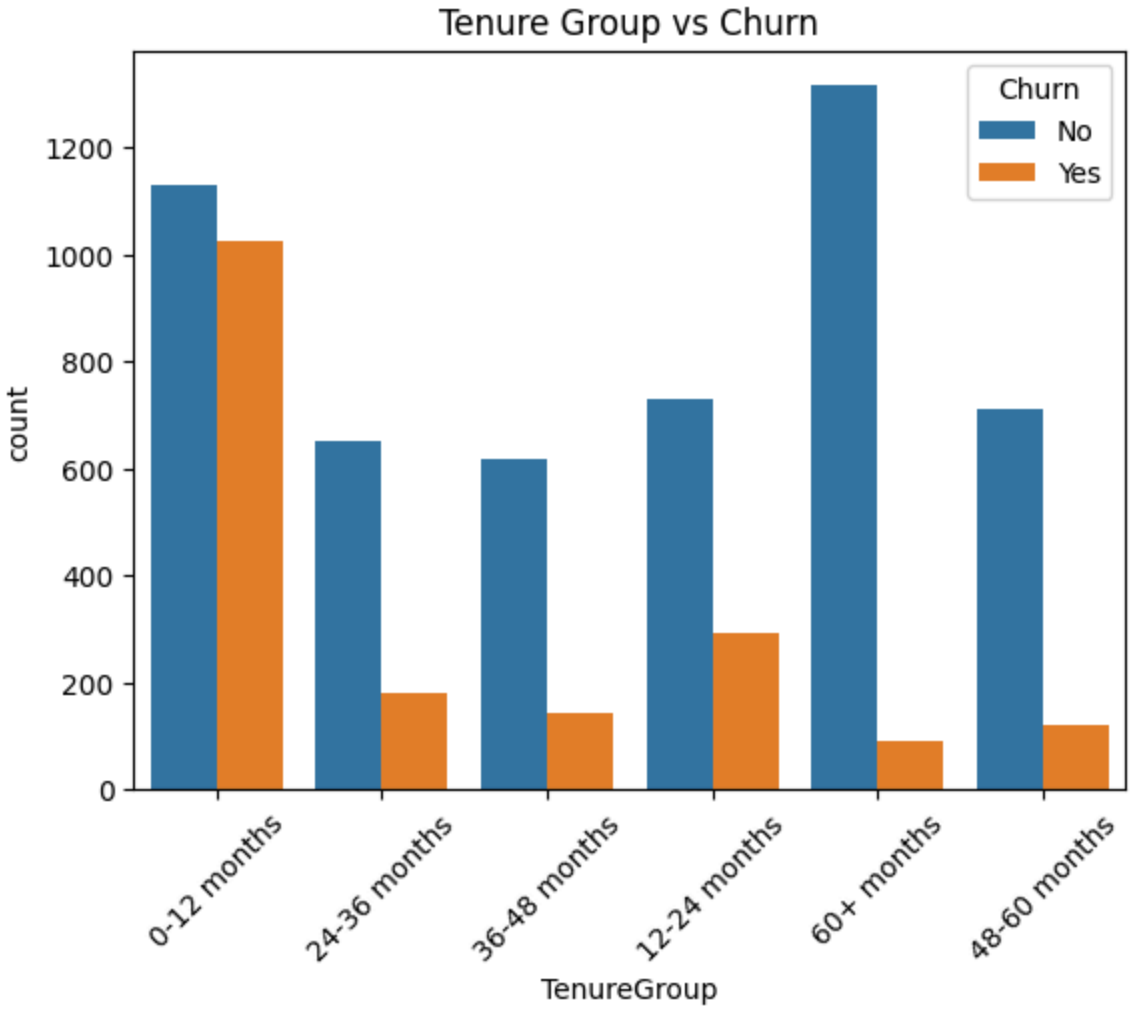
create new colomn that demonstreate the time of tenure that leave

Generate plot that show us churn and tenure group

In [82]:
```
def tenure_group(tenure):
    if tenure <= 12:
        return '0-12 months'
    elif tenure <= 24:
        return '12-24 months'
    elif tenure <= 36:
        return '24-36 months'
    elif tenure <= 48:
        return '36-48 months'
    elif tenure <= 60:
        return '48-60 months'
    else:
        return '60+ months'

dataFrame['TenureGroup'] = dataFrame['tenure'].apply(tenure_group)

# Create Total Revenue Feature
dataFrame['TotalRevenue'] = dataFrame['MonthlyCharges'] * dataFrame['tenure']
sns.countplot(x='TenureGroup', hue='Churn', data=dataFrame)
plt.title('Tenure Group vs Churn')
plt.xticks(rotation=45)
plt.show()
```



Notes:

we see customers between 0-12 months more churn

insights and Notes

Churn rate

Approximately 26.5% of customers churned

tenure and churn

customers with first monuts 0-12 are more churn this mean firsts mounths is important

monthly charges and churn

customers that have high montly charges is more likely to churn this mean there dissatisfaction about pricing

internet service and churn

the customers that use fiber optic service is more likely to churn this mean two things srevice issues or high price

this analysis tell us:

Focus on new customers

make strategies to customers in there first year with good offers

review pricing

evaluate the price of premium plans especially for fiber optic users