DATA ANALYSIS PYTHON PROJECT - CUSTOMERS CHURN ANALYSIS

Import Libraries

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

Load CSV File

In [2]:
```
df = pd.read_csv(r"C:\Users\Dell\Downloads\Customer Churn.csv", encoding= 'latin1')
```

In [3]:
```
df
```

Out[3]:

	customerID	gender	SeniorCitizen	Partner	Dependents	tenure	PhoneService	Mu
0	7590-VHVEG	Female	0	Yes	No	1	No	
1	5575-GNVDE	Male	0	No	No	34	Yes	
2	3668-QPYBK	Male	0	No	No	2	Yes	
3	7795-CFOCW	Male	0	No	No	45	No	
4	9237-HQITU	Female	0	No	No	2	Yes	
...	...	...	...	...	...	...	...	
7038	6840-RESVB	Male	0	Yes	Yes	24	Yes	
7039	2234-XADUH	Female	0	Yes	Yes	72	Yes	
7040	4801-JZAZL	Female	0	Yes	Yes	11	No	
7041	8361-LTMKD	Male	1	Yes	No	4	Yes	
7042	3186-AJIEK	Male	0	No	No	66	Yes	

7043 rows × 21 columns

In [4]:
```
df.head()
```

Out[4]:

	customerID	gender	SeniorCitizen	Partner	Dependents	tenure	PhoneService	Multipl
0	7590-VHVEG	Female	0	Yes	No	1	No	No
1	5575-GNVDE	Male	0	No	No	34	Yes	
2	3668-QPYBK	Male	0	No	No	2	Yes	
3	7795-CFOCW	Male	0	No	No	45	No	No
4	9237-HQITU	Female	0	No	No	2	Yes	

5 rows × 21 columns

Inspection of Data

In [5]:
```
df.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
```

Replacing blanks with 0 as tenure is 0 and no total charges are recorded

In [6]:
```
df['TotalCharges'] = df['TotalCharges'].replace(" ",'0')
df['TotalCharges'] = df['TotalCharges'].astype("float")
```

In [7]:
```
df.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 
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 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   float64
 20  Churn             7043 non-null   object 
dtypes: float64(2), int64(2), object(17)
memory usage: 1.1+ MB
```

Checking NULL Values

In [8]:
```
df.isnull().sum().sum()
```

Out[8]:
```
np.int64(0)
```

In [9]:
```
df.describe()
```

Out[9]:

	SeniorCitizen	tenure	MonthlyCharges	TotalCharges
count	7043.000000	7043.000000	7043.000000	7043.000000
mean	0.162147	32.371149	64.761692	2279.734304
std	0.368612	24.559481	30.090047	2266.794470
min	0.000000	0.000000	18.250000	0.000000
25%	0.000000	9.000000	35.500000	398.550000
50%	0.000000	29.000000	70.350000	1394.550000
75%	0.000000	55.000000	89.850000	3786.600000
max	1.000000	72.000000	118.750000	8684.800000

Check Duplicate values

In [10]:
```
df.duplicated().sum()
```

Out[10]:
```
np.int64(0)
```

Check duplicate values using Unique keys or Primary Keys

In [11]:
```
df["customerID"].duplicated().sum()
```

Out[11]:
```
np.int64(0)
```

Coverted 0 and 1 value of senior citizen to yes/no to make it easier to understand

In [12]:
```
def convo(value):
    if value == 1:
        return "yes"
    else:
        return "no"

df['SeniorCitizen'] = df['SeniorCitizen'].apply(convo)
```

In [13]:
```
df.head()
```

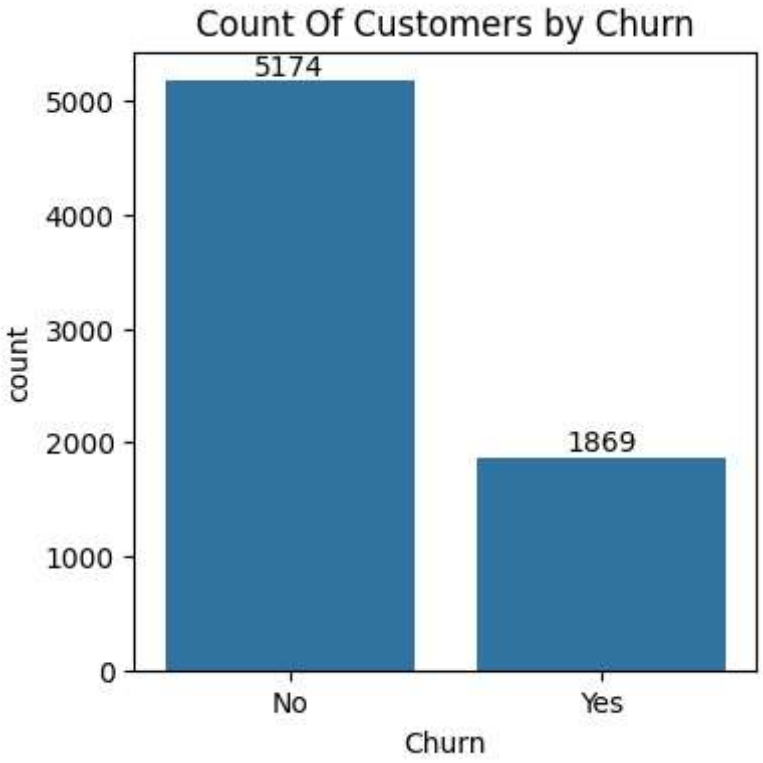
Out[13]:

	customerID	gender	SeniorCitizen	Partner	Dependents	tenure	PhoneService	Multipl
0	7590-VHVEG	Female	no	Yes	No	1	No	No
1	5575-GNVDE	Male	no	No	No	34	Yes	
2	3668-QPYBK	Male	no	No	No	2	Yes	
3	7795-CFOCW	Male	no	No	No	45	No	No
4	9237-HQITU	Female	no	No	No	2	Yes	

5 rows × 21 columns

Create a count plot to show the number of customers who churned vs. those who didn't

In [14]:
```
plt.figure(figsize=(4,4))
a = sns.countplot(x = 'Churn' , data = df)

a.bar_label(a.containers[0])
plt.title("Count Of Customers by Churn")
plt.show()
```

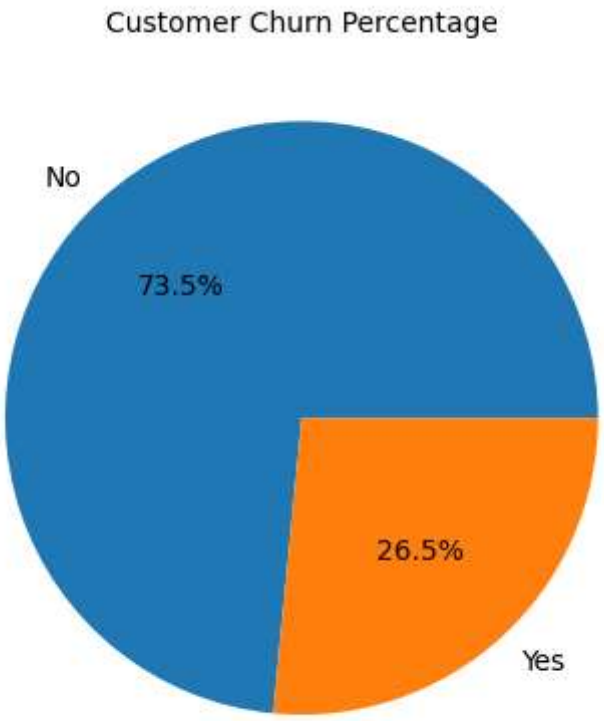


What is the percentage of customers who have churned versus those who haven't? Can we show it using a pie chart?

In [15]:
```
churn_counts = df['Churn'].value_counts()
print(churn_counts)
```

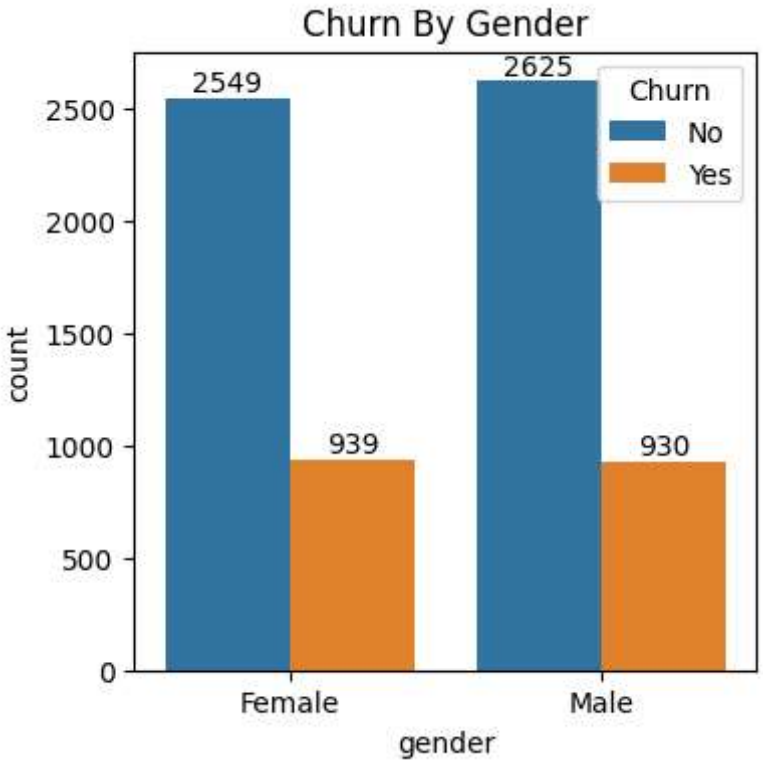
```
Churn
No     5174
Yes    1869
Name: count, dtype: int64
```

In [51]:
```
plt.pie(churn_counts,
        labels=churn_counts.index,
        autopct='%.1f%%')
plt.title("Customer Churn Percentage", fontsize = 10)
plt.show()
```



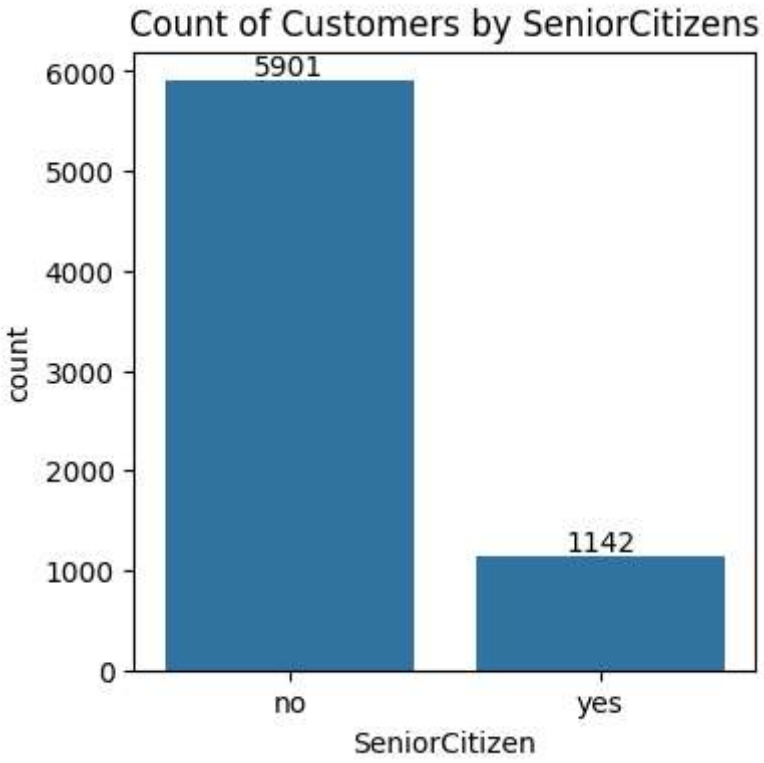
Is there any difference in churn rate between male and female customers? Show it using a count plot

In [17]:
```
plt.figure(figsize=(4,4))
ax = sns.countplot(x = 'gender', data=df,hue = 'Churn')

for i in ax.containers:
    ax.bar_label(i)

plt.title("Churn By Gender")
plt.show()
```



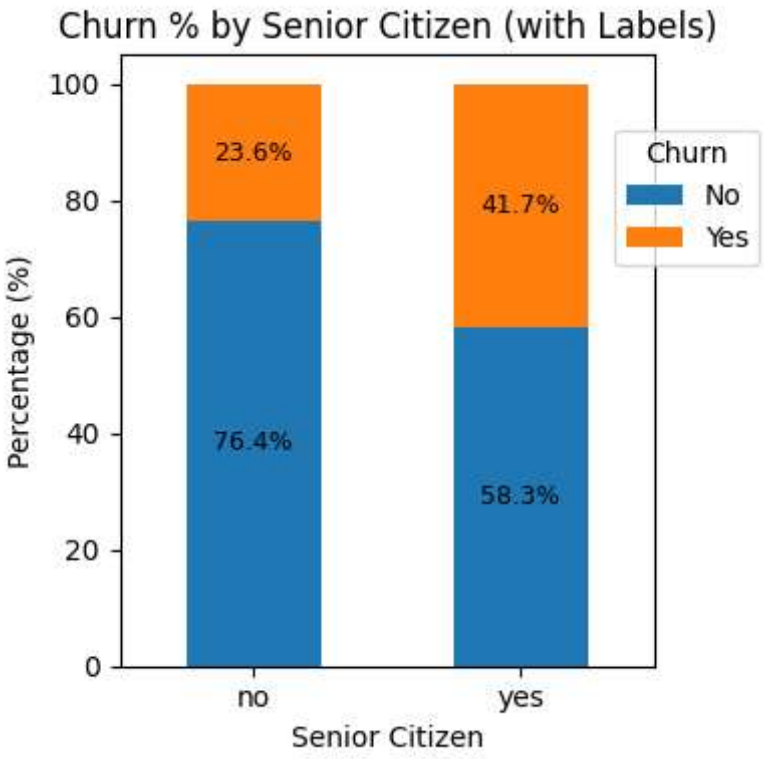
How many customers are senior citizens and how many are not? Show the count using a bar chart

In [52]:
```
plt.figure(figsize = (4,4))
ax = sns.countplot(x = 'SeniorCitizen', data = df)

ax.bar_label(ax.containers[0])

plt.title("Count of Customers by SeniorCitizens")
plt.show()
```



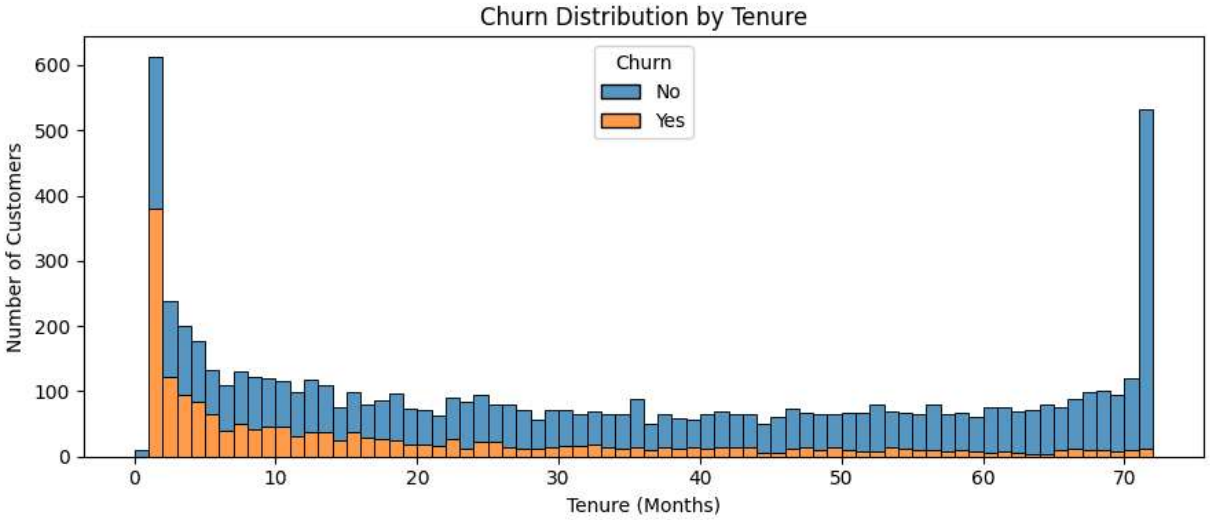
What is the percentage distribution of churn among senior and non-senior citizens? Show it using a stacked bar chart

In [34]:
```
#Group data seniorcitizen and churn , calculate percentage
churn_pct = df.groupby('SeniorCitizen')['Churn'].value_counts(normalize = True).uns

#Normalize gives percentage instead of count
#unstack gives yes n no in seperated column

#Create the stacked bar chart
ax = churn_pct.plot(kind = 'bar',stacked= True, figsize=(4,4))

#Add percentage label to each bar segment
for p in ax.patches:
    height = p.get_height()
    width = p.get_width()

    x,y = p.get_xy()  #botttom-left coordinate of the bar
    ax.text(x + width / 2, y + height / 2,
           f'{height:.1f}%',
           ha = 'center' , va = 'center', fontsize = 9)

#Customize the chart
plt.title("Churn % by Senior Citizen (with Labels)")
plt.xlabel("Senior Citizen")
plt.ylabel("Percentage (%)")
plt.xticks(rotation=0)
plt.legend(title='Churn', bbox_to_anchor = (0.9,0.9))
plt.tight_layout()
```



How is customer churn distributed over different tenure periods? Show using a histogram

In [54]:
```
#Set figure size
plt.figure(figsize = (9,4))

#Create histogram by tenure, colored by churn
sns.histplot(
    x = 'tenure',
    data = df,
    bins = 72,
    hue = 'Churn',
    multiple = 'stack')

plt.title("Churn Distribution by Tenure")
plt.xlabel("Tenure (Months)")
plt.ylabel("Number of Customers")

plt.tight_layout()
plt.show()
```

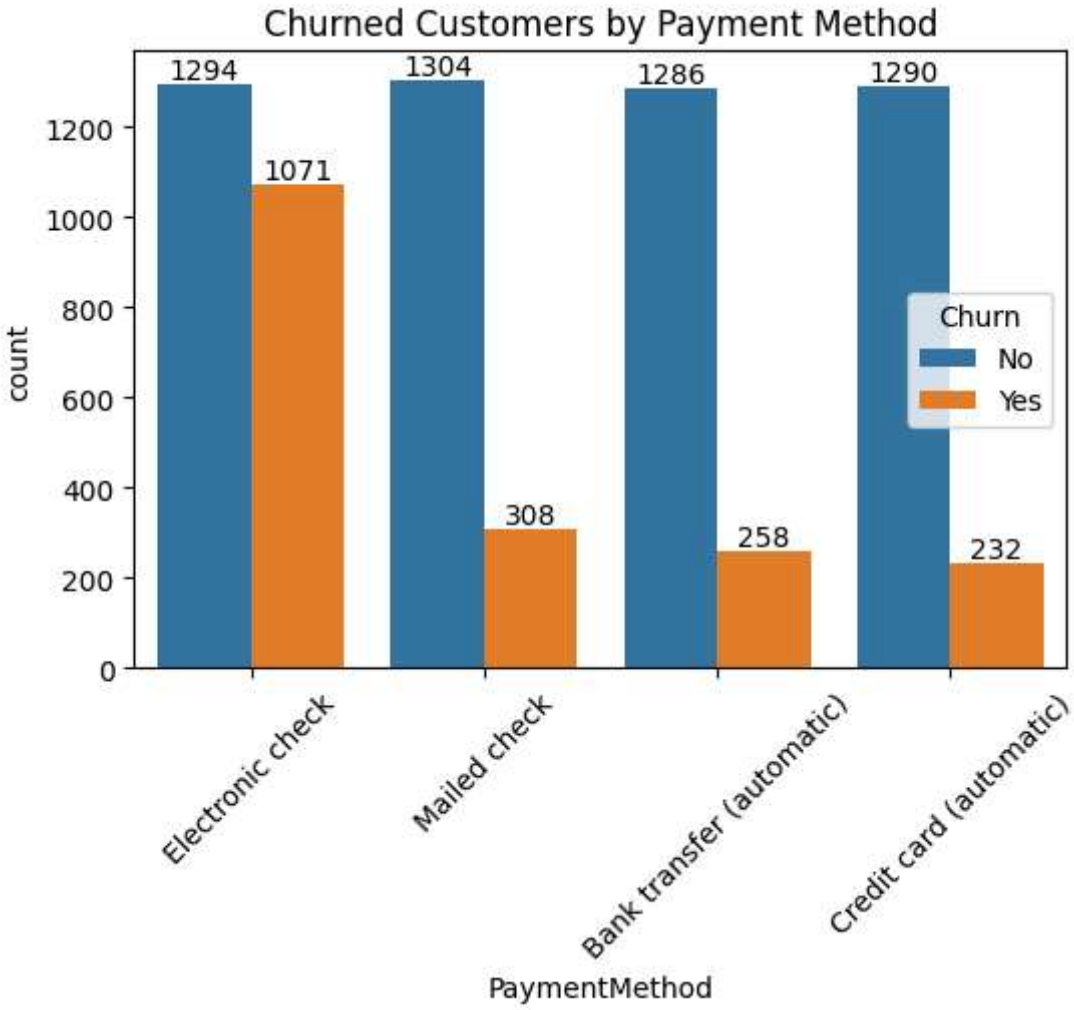


Count Of customers by contract

In [44]:
```
plt.figure(figsize = (4,4))

ax = sns.countplot(x ='Contract', data=df, hue='Churn')

for a in ax.containers:
    ax.bar_label(a)

plt.title("Count of Customers by Contract")
plt.show()
```

Customers by Payment Method

In [45]:
```
plt.figure(figsize = (6,4))

ax = sns.countplot(x = "PaymentMethod", data = df, hue = "Churn")

ax.bar_label(ax.containers[0])
ax.bar_label(ax.containers[1])

plt.title("Churned Customers by Payment Method")
plt.xticks(rotation = 45)
plt.show()
```



End Of The Project