In [1]:
```
### Imporing Libraries

import pandas as pd
import matplotlib.pyplot as plt
```

In [2]:
```
###  Data Prepration

# Loading data

uber_df = pd.read_csv("C:/Users/hp/Downloads/UberDataset.csv")
uber_df.head()
```

Out[2]:

	START_DATE	END_DATE	CATEGORY	START	STOP	MILES	PURPOSE
0	01-01-2016 21:11	01-01-2016 21:17	Business	Fort Pierce	Fort Pierce	5.1	Meal/Entertain
1	01-02-2016 01:25	01-02-2016 01:37	Business	Fort Pierce	Fort Pierce	5.0	NaN
2	01-02-2016 20:25	01-02-2016 20:38	Business	Fort Pierce	Fort Pierce	4.8	Errand/Supplies
3	01-05-2016 17:31	01-05-2016 17:45	Business	Fort Pierce	Fort Pierce	4.7	Meeting
4	01-06-2016 14:42	01-06-2016 15:49	Business	Fort Pierce	West Palm Beach	63.7	Customer Visit

In [3]:
```
# Data about data

rows = len(uber_df)
print("Number of observations in dataframe : " , rows )
```

```
Number of observations in dataframe :  1156
```

In [4]:
```
print("Data types of all columns in uber_df:")
print(uber_df.dtypes)
```

```
Data types of all columns in uber_df:
START_DATE     object
END_DATE       object
CATEGORY       object
START          object
STOP           object
MILES         float64
PURPOSE        object
dtype: object
```

In [5]:
```
Null_per_Col = uber_df.isna().sum()
print("Number of NaN values per column: ")
print(Null_per_Col)
```

```
Number of NaN values per column:
START_DATE      0
END_DATE        1
CATEGORY        1
START           1
STOP            1
MILES           0
PURPOSE       503
dtype: int64
```

In [6]:
```
#Converting Data Types

# Convert the 'START_DATE' and 'END_DATE' columns to datetime with 'coerce'
uber_df['START_DATE'] = pd.to_datetime(uber_df['START_DATE'], errors='coerce')
uber_df['END_DATE'] = pd.to_datetime(uber_df['END_DATE'], errors='coerce')

# Now, check the data types of 'START_DATE' and 'END_DATE' columns
print("Data type of 'START_DATE':", uber_df['START_DATE'].dtype)
print("Data type of 'END_DATE':", uber_df['END_DATE'].dtype)
```

```
Data type of 'START_DATE': datetime64[ns]
Data type of 'END_DATE': datetime64[ns]
```

In [7]:
```
# Replacing values

#I've noticed the word Karachi is not spelled correctly
# Replace "Kar?chi" with "Karachi" in 'START' and 'STOP' columns
uber_df['START'] = uber_df['START'].replace("Kar?chi", "Karachi")
uber_df['STOP'] = uber_df['STOP'].replace("Kar?chi", "Karachi")
```

In [8]:
```
# Droping Na Values

columns_to_drop = uber_df.columns.drop('PURPOSE')
uber_df.dropna(subset=columns_to_drop, inplace=True)
uber_df
```

Out[8]:

	START_DATE	END_DATE	CATEGORY	START	STOP	MILES	PURPOSE
0	2016-01-01 21:11:00	2016-01-01 21:17:00	Business	Fort Pierce	Fort Pierce	5.1	Meal/Entertain
1	2016-01-02 01:25:00	2016-01-02 01:37:00	Business	Fort Pierce	Fort Pierce	5.0	NaN
2	2016-01-02 20:25:00	2016-01-02 20:38:00	Business	Fort Pierce	Fort Pierce	4.8	Errand/Supplies
3	2016-01-05 17:31:00	2016-01-05 17:45:00	Business	Fort Pierce	Fort Pierce	4.7	Meeting
4	2016-01-06 14:42:00	2016-01-06 15:49:00	Business	Fort Pierce	West Palm Beach	63.7	Customer Visit
...	...	...	...	...	...	...	...
1150	2016-12-31 01:07:00	2016-12-31 01:14:00	Business	Karachi	Karachi	0.7	Meeting
1151	2016-12-31 13:24:00	2016-12-31 13:42:00	Business	Karachi	Unknown Location	3.9	Temporary Site
1152	2016-12-31 15:03:00	2016-12-31 15:38:00	Business	Unknown Location	Unknown Location	16.2	Meeting
1153	2016-12-31 21:32:00	2016-12-31 21:50:00	Business	Katunayake	Gampaha	6.4	Temporary Site
1154	2016-12-31 22:08:00	2016-12-31 23:51:00	Business	Gampaha	Ilukwatta	48.2	Temporary Site

1155 rows × 7 columns

In [9]:
```
#Checking if the na values are removed
#We don't have to remove the na Values from Purpose column That is not nessessary

Null_per_Col = uber_df.isna().sum()
print("Number of NaN values per column: ")
print(Null_per_Col)
```

```
Number of NaN values per column:
START_DATE      0
END_DATE        0
CATEGORY        0
START           0
STOP            0
MILES           0
PURPOSE       502
dtype: int64
```

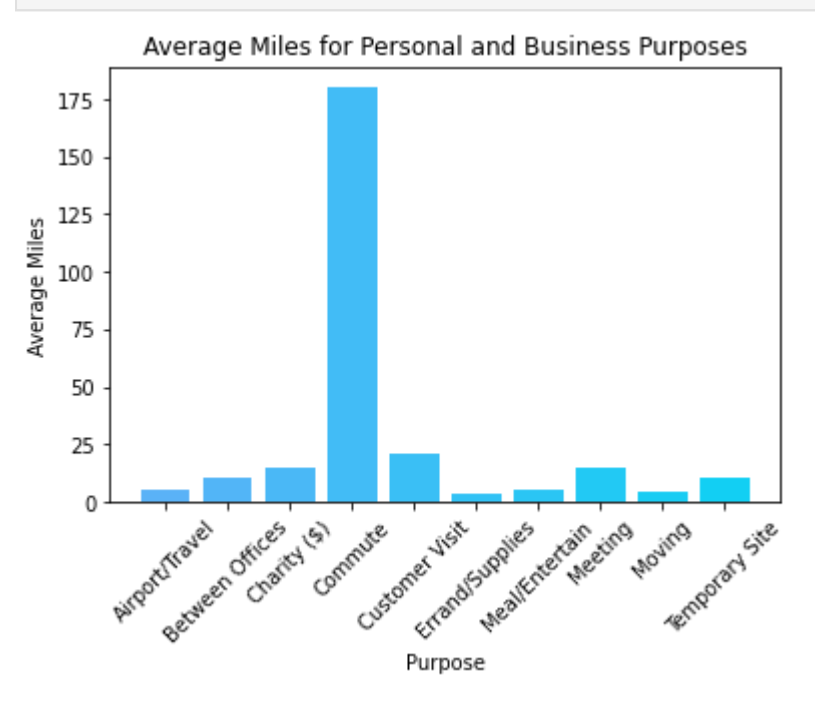
In [10]:
```
### EDA
##  Checking Stations and Categories


columns_to_check = ['CATEGORY' , 'PURPOSE']

for column in columns_to_check:
    distinct_values = uber_df[column].unique()
    print(f"Distinct values in '{column}':")
    print(distinct_values)
    print()
```

```
Distinct values in 'CATEGORY':
['Business' 'Personal']

Distinct values in 'PURPOSE':
['Meal/Entertain' nan 'Errand/Supplies' 'Meeting' 'Customer Visit'
 'Temporary Site' 'Between Offices' 'Charity ($)' 'Commute' 'Moving'
 'Airport/Travel']
```

In [11]:
```
### Miles by purpose

average_miles_by_purpose = uber_df.groupby('PURPOSE')['MILES'].mean()
average_miles_by_purpose
```

Out[11]:
```
PURPOSE
Airport/Travel       5.500000
Between Offices     10.944444
Charity ($)         15.100000
Commute            180.200000
Customer Visit      20.688119
Errand/Supplies      3.968750
Meal/Entertain       5.698125
Meeting             15.247594
Moving               4.550000
Temporary Site      10.474000
Name: MILES, dtype: float64
```

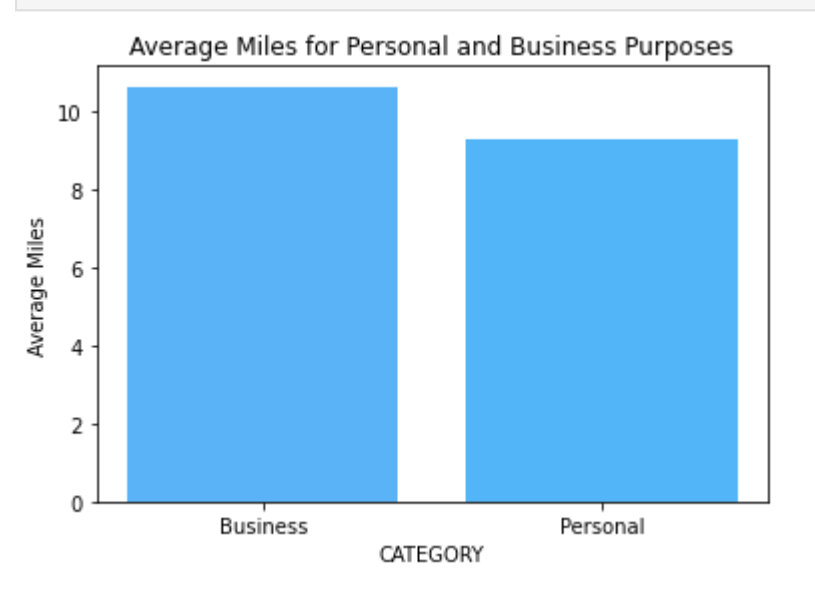
In [12]:
```
# Define a custom color palette for the bar plots
colors = ['#5AB2F7', '#52B5F7', '#4AB8F6', '#42BCF6', '#3ABFF5', '#32C2F5', '#2AC5F4', '#22C9F4', '#1ACCF3', '#12CFF3']

# Plotting the bar chart
plt.bar(average_miles_by_purpose.index, average_miles_by_purpose.values , color=colors)
plt.xlabel('Purpose')
plt.ylabel('Average Miles')
plt.title('Average Miles for Personal and Business Purposes')
plt.xticks(rotation=45)
plt.show()
```



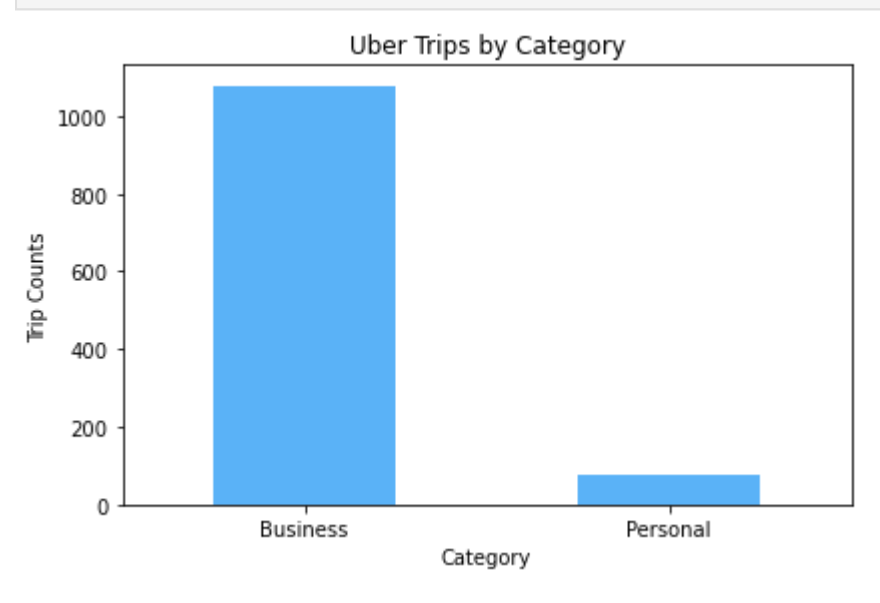
In [13]:
```
# Miles by Category

average_miles_by_cat = uber_df.groupby('CATEGORY')['MILES'].mean()
average_miles_by_cat
```

Out[13]:
```
CATEGORY
Business    10.655844
Personal     9.320779
Name: MILES, dtype: float64
```

In [14]:
```
plt.bar(average_miles_by_cat.index, average_miles_by_cat.values , color=colors)
plt.xlabel('CATEGORY')
plt.ylabel('Average Miles')
plt.title('Average Miles for Personal and Business Purposes')
plt.show()
```



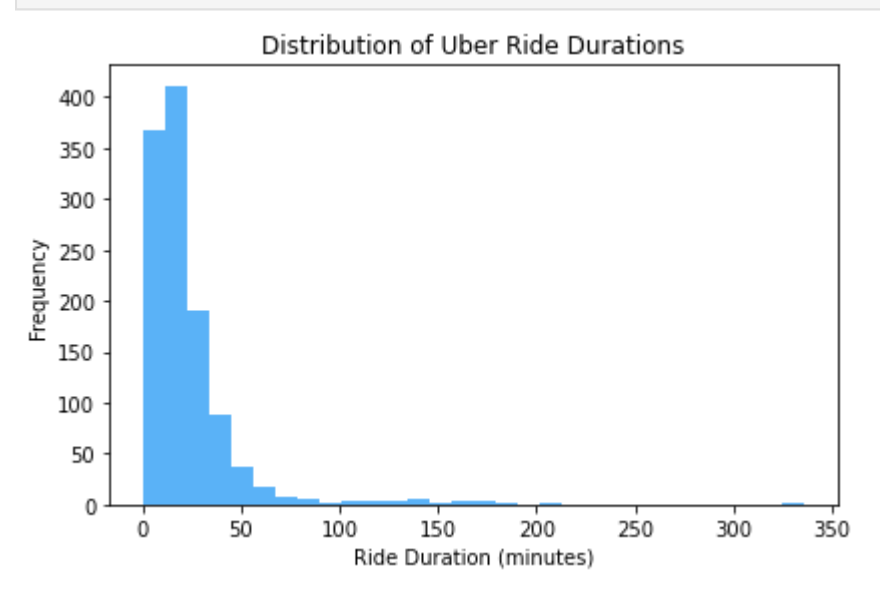
In [15]:
```
# Trips by Categories

trips = pd.DataFrame(uber_df["CATEGORY"].value_counts())

color = ['#5AB2F7', '#12CFF3']

ax = trips.plot(kind="bar", color=color, legend=None)

plt.xlabel('Category')
plt.ylabel('Trip Counts')
plt.title('Uber Trips by Category')
plt.xticks(rotation=0)
plt.tight_layout()
plt.show()
```



In [17]:
```
## Ride durations

# Calculate ride durations as the difference between END_DATE and START_DATE
uber_df['ride_duration'] = uber_df['END_DATE'] - uber_df['START_DATE']

# Calculate min, max, and average ride durations
min_duration = uber_df['ride_duration'].min()
max_duration = uber_df['ride_duration'].max()
average_duration = uber_df['ride_duration'].mean()

print("Minimum ride duration:", min_duration)
print("Maximum ride duration:", max_duration)
print("Average ride duration:", average_duration)
```

```
Minimum ride duration: 0 days 00:00:00
Maximum ride duration: 0 days 05:36:00
Average ride duration: 0 days 00:23:14.597402597
```

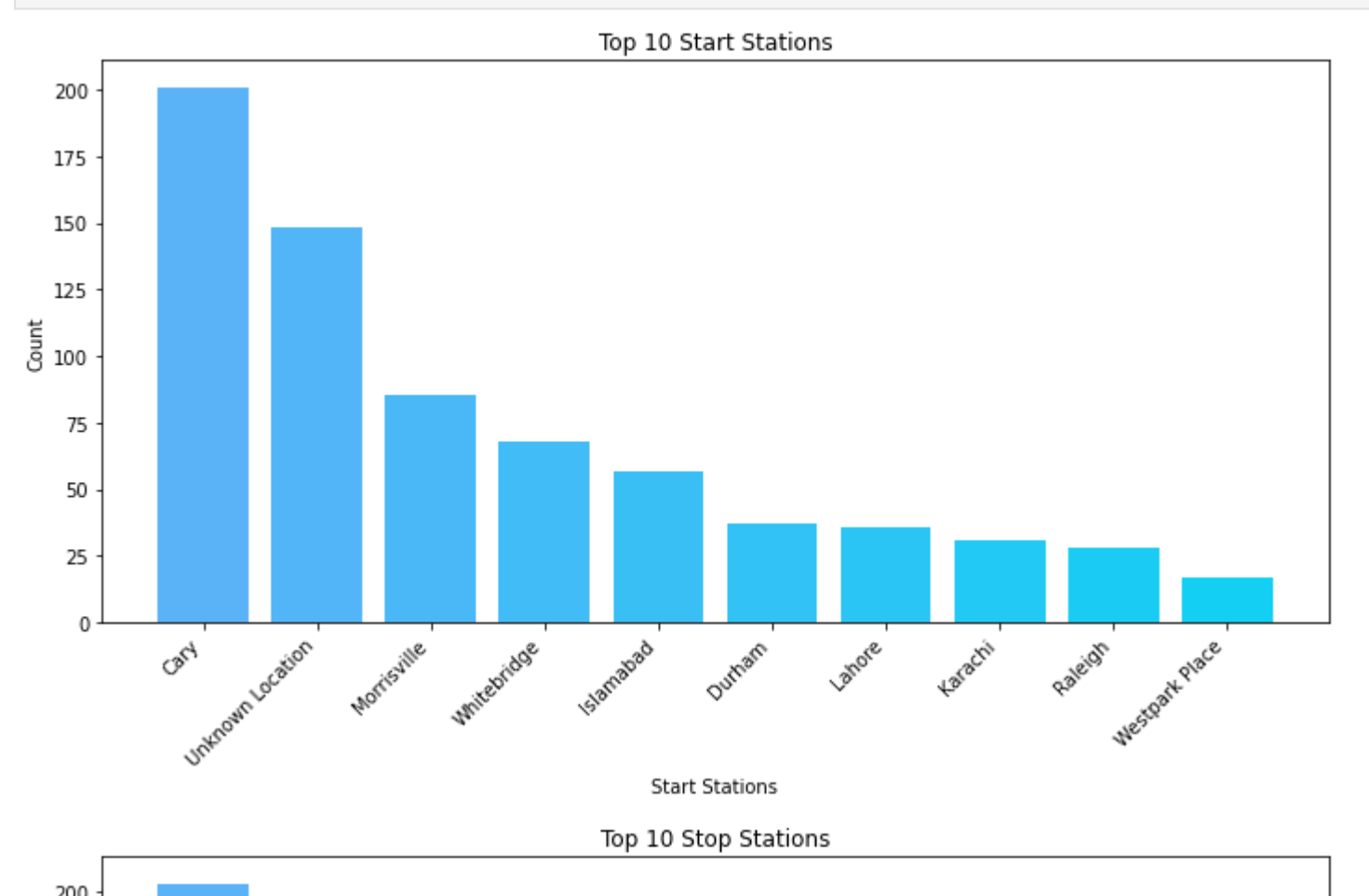
In [18]:
```
#Making plot

plt.hist(uber_df['ride_duration'].dt.total_seconds() / 60, bins=30 , color= '#5AB2F7')
plt.xlabel('Ride Duration (minutes)')
plt.ylabel('Frequency')
plt.title('Distribution of Uber Ride Durations')
plt.tight_layout()
plt.show()
```

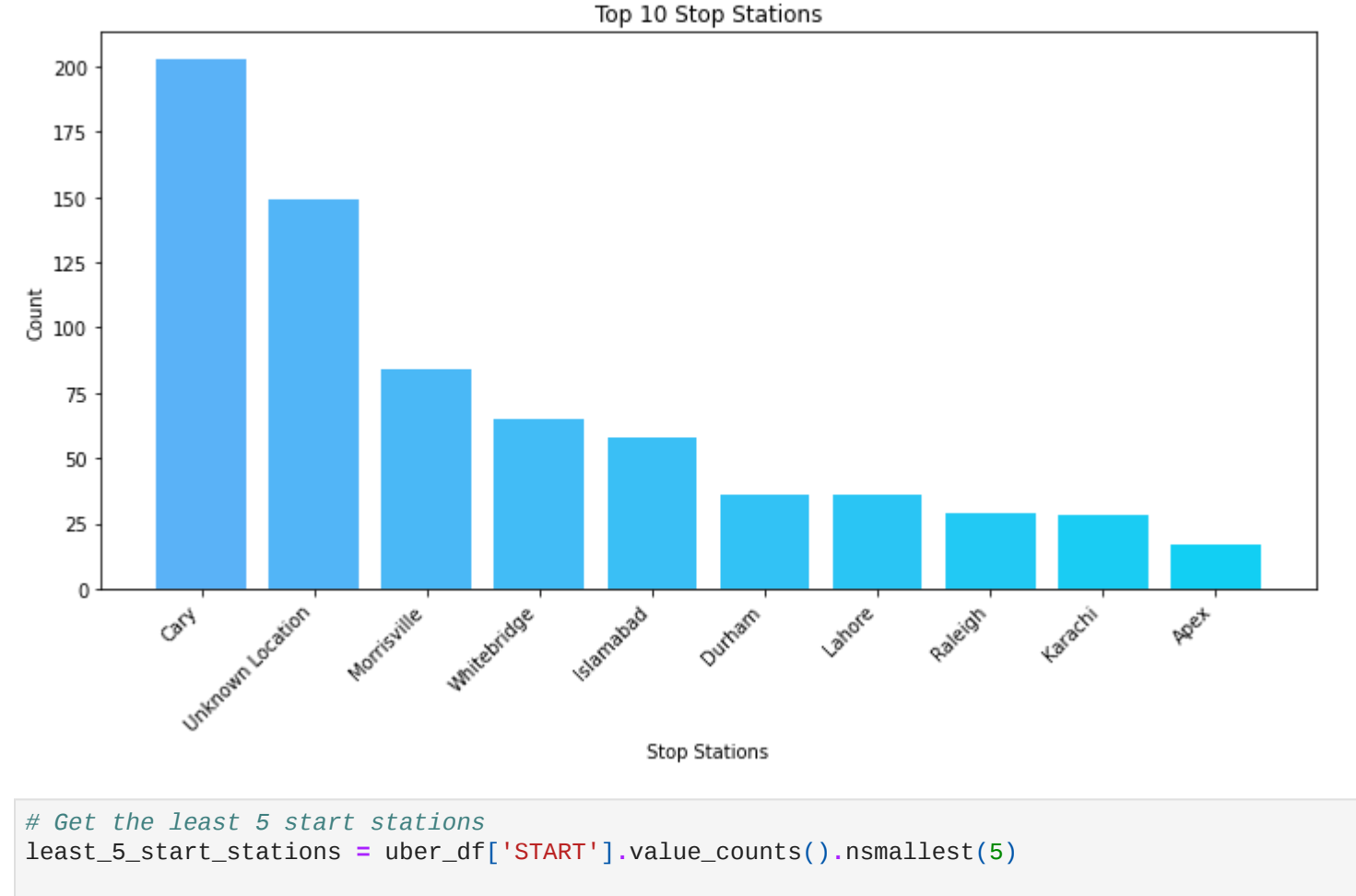


In [19]:
```
# Stations performence


# Get the top 10 start stations
top_10_start_stations = uber_df['START'].value_counts().nlargest(10)

# Get the top 10 stop stations
top_10_stop_stations = uber_df['STOP'].value_counts().nlargest(10)

print("Top 10 Start Stations:")
print(top_10_start_stations)

print("\nTop 10 Stop Stations:")
print(top_10_stop_stations)
```

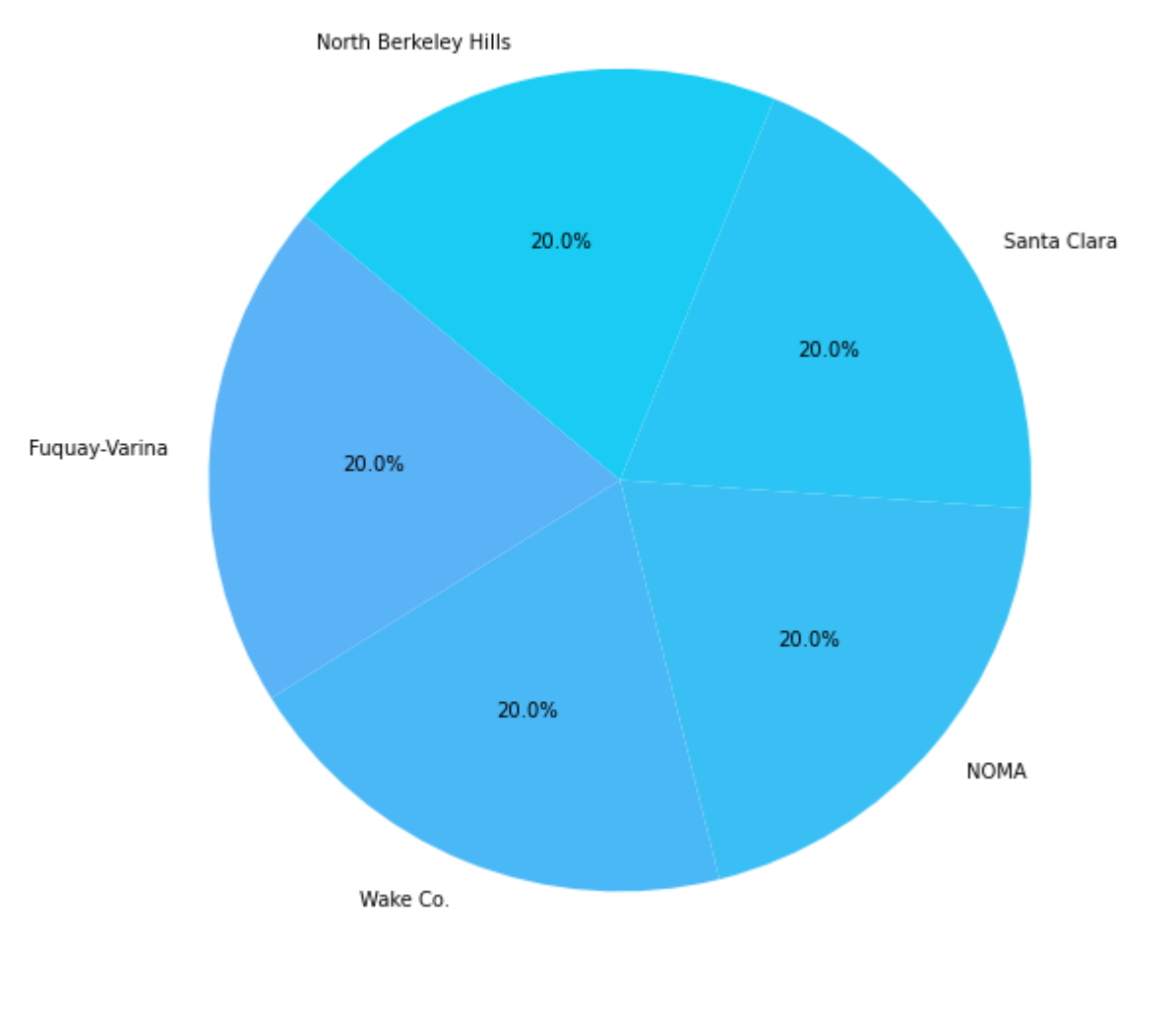
```
Top 10 Start Stations:
Cary                201
Unknown Location    148
Morrisville          85
Whitebridge          68
Islamabad            57
Durham               37
Lahore               36
Karachi              31
Raleigh              28
Westpark Place       17
Name: START, dtype: int64

Top 10 Stop Stations:
Cary                203
Unknown Location    149
Morrisville          84
Whitebridge          65
Islamabad            58
Durham               36
Lahore               36
Raleigh              29
Karachi              28
Apex                 17
Name: STOP, dtype: int64
```

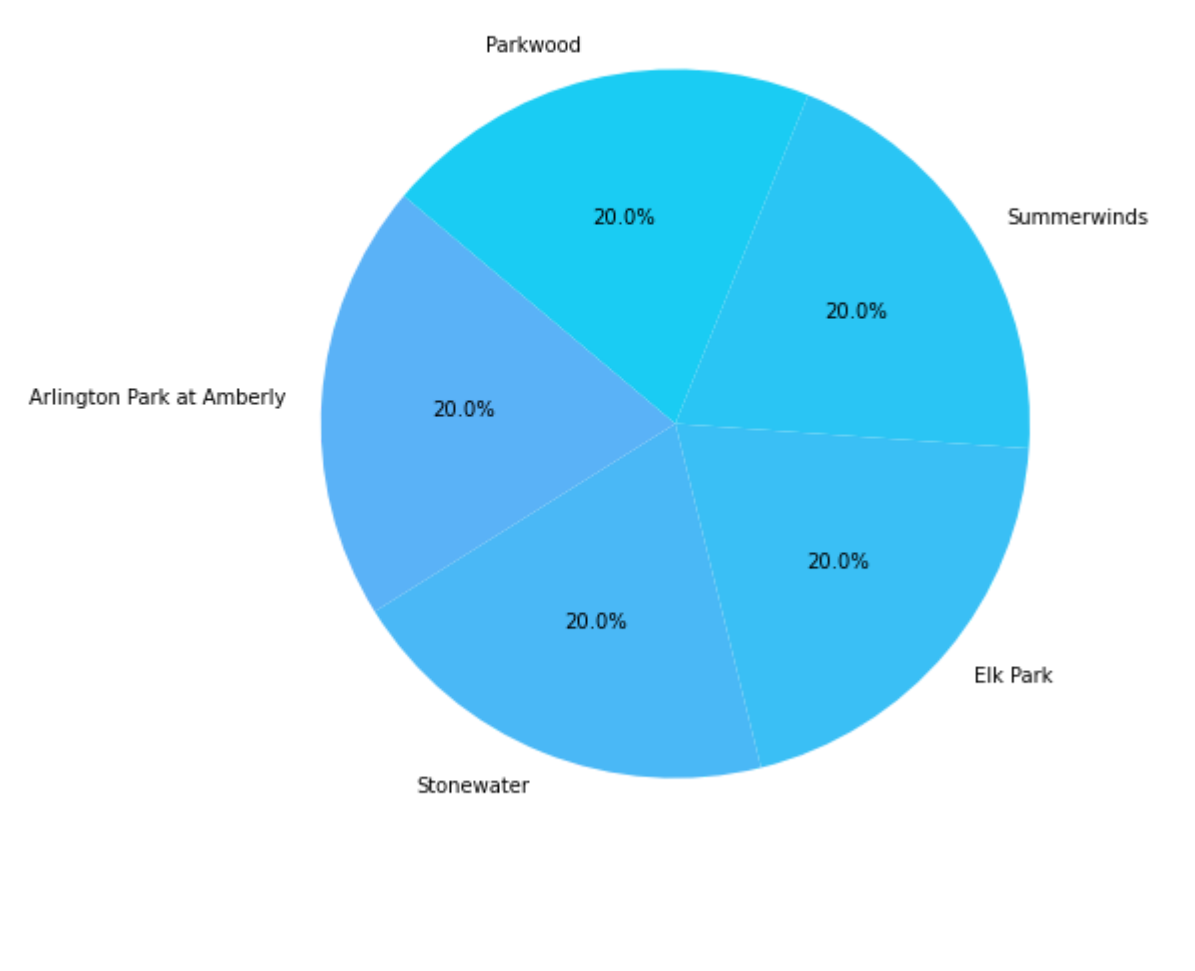
In [20]:
```
# Plotting the top 10 start stations
plt.figure(figsize=(10, 6))
plt.bar(top_10_start_stations.index, top_10_start_stations.values  , color=colors)
plt.xlabel('Start Stations')
plt.ylabel('Count')
plt.title('Top 10 Start Stations')
plt.xticks(rotation=45, ha='right')
plt.tight_layout()
plt.show()

# Plotting the top 10 stop stations
plt.figure(figsize=(10, 6))
plt.bar(top_10_stop_stations.index, top_10_stop_stations.values , color=colors)
plt.xlabel('Stop Stations')
plt.ylabel('Count')
plt.title('Top 10 Stop Stations')
plt.xticks(rotation=45, ha='right')
plt.tight_layout()
plt.show()
```





In [21]:
```
# Get the least 5 start stations
least_5_start_stations = uber_df['START'].value_counts().nsmallest(5)

# Get the least 5 stop stations
least_5_stop_stations = uber_df['STOP'].value_counts().nsmallest(5)

five_colors = ['#5AB2F7', '#4AB8F6', '#3ABFF5', '#2AC5F4', '#1ACCF3']

# Plotting the top 10 start stations as a pie chart
plt.figure(figsize=(8, 8))
plt.pie(least_5_start_stations, labels=least_5_start_stations.index, autopct='%1.1f%%', startangle=140, colors=five_colors)
plt.axis('equal')
plt.title('Least 5 Start Stations')
plt.tight_layout()
plt.show()

# Plotting the top 10 stop stations as a pie chart
plt.figure(figsize=(8, 8))
plt.pie(least_5_stop_stations, labels=least_5_stop_stations.index, autopct='%1.1f%%', startangle=140, colors=five_colors)
plt.axis('equal')
plt.title('Least 5 Stop Stations')
plt.tight_layout()
plt.show()
```





In [ ]: