In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
```

In [2]:
```
dataset = pd.read_csv("UberDataset.csv")
```

In [3]:
```
dataset
```

Out[3]:

	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
...	...	...	...	...	...	...	...
1151	12/31/2016 13:24	12/31/2016 13:42	Business	Kar?chi	Unknown Location	3.9	Temporary Site
1152	12/31/2016 15:03	12/31/2016 15:38	Business	Unknown Location	Unknown Location	16.2	Meeting
1153	12/31/2016 21:32	12/31/2016 21:50	Business	Katunayake	Gampaha	6.4	Temporary Site
1154	12/31/2016 22:08	12/31/2016 23:51	Business	Gampaha	Ilukwatta	48.2	Temporary Site
1155	Totals	NaN	NaN	NaN	NaN	12204.7	NaN

1156 rows × 7 columns

In [4]:
```
dataset.shape
```

Out[4]:
```
(1156, 7)
```

In [5]:
```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1156 entries, 0 to 1155
Data columns (total 7 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   START_DATE  1156 non-null   object 
 1   END_DATE    1155 non-null   object 
 2   CATEGORY    1155 non-null   object 
 3   START       1155 non-null   object 
 4   STOP        1155 non-null   object 
 5   MILES       1156 non-null   float64
 6   PURPOSE     653 non-null    object 
dtypes: float64(1), object(6)
memory usage: 63.3+ KB
```

Data Preprocessing

In [6]:
```
dataset['PURPOSE'].fillna("Not",inplace = True)
```

In [7]:
```
dataset.head()
```

Out[7]:

	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	Not
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 [8]:
```
dataset['START_DATE'] = pd.to_datetime(dataset['START_DATE'], errors = 'coerce')
```

In [9]:
```
dataset['END_DATE'] = pd.to_datetime(dataset['END_DATE'], errors = 'coerce')
```

In [10]:
```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1156 entries, 0 to 1155
Data columns (total 7 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   START_DATE  421 non-null    datetime64[ns]
 1   END_DATE    420 non-null    datetime64[ns]
 2   CATEGORY    1155 non-null   object
 3   START       1155 non-null   object
 4   STOP        1155 non-null   object
 5   MILES       1156 non-null   float64
 6   PURPOSE     1156 non-null   object
dtypes: datetime64[ns](2), float64(1), object(4)
memory usage: 63.3+ KB
```

In [11]:
```
from datetime import datetime

dataset['Date'] = pd.DatetimeIndex(dataset['START_DATE']).date
```

In [12]:
```
dataset['Time'] = pd.DatetimeIndex(dataset['START_DATE']).hour
```

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

Out[13]:

	START_DATE	END_DATE	CATEGORY	START	STOP	MILES	PURPOSE	Date	Time
0	2016-01-01 21:11:00	2016-01-01 21:17:00	Business	Fort Pierce	Fort Pierce	5.1	Meal/Entertain	2016-01-01	21.0
1	2016-01-02 01:25:00	2016-01-02 01:37:00	Business	Fort Pierce	Fort Pierce	5.0	Not	2016-01-02	1.0
2	2016-01-02 20:25:00	2016-01-02 20:38:00	Business	Fort Pierce	Fort Pierce	4.8	Errand/Supplies	2016-01-02	20.0
3	2016-01-05 17:31:00	2016-01-05 17:45:00	Business	Fort Pierce	Fort Pierce	4.7	Meeting	2016-01-05	17.0
4	2016-01-06 14:42:00	2016-01-06 15:49:00	Business	Fort Pierce	West Palm Beach	63.7	Customer Visit	2016-01-06	14.0

In [14]:
```
dataset['Day-Night'] = pd.cut(x = dataset['Time'], bins = [0,10,15,17,24], labels = ['Morning', 'Afternoon', 'E
```

In [15]:
```
dataset.head()
```

Out[15]:

	START_DATE	END_DATE	CATEGORY	START	STOP	MILES	PURPOSE	Date	Time	Day-Night
0	2016-01-01 21:11:00	2016-01-01 21:17:00	Business	Fort Pierce	Fort Pierce	5.1	Meal/Entertain	2016-01-01	21.0	Night
1	2016-01-02 01:25:00	2016-01-02 01:37:00	Business	Fort Pierce	Fort Pierce	5.0	Not	2016-01-02	1.0	Morning
2	2016-01-02 20:25:00	2016-01-02 20:38:00	Business	Fort Pierce	Fort Pierce	4.8	Errand/Supplies	2016-01-02	20.0	Night
3	2016-01-05 17:31:00	2016-01-05 17:45:00	Business	Fort Pierce	Fort Pierce	4.7	Meeting	2016-01-05	17.0	Evening
4	2016-01-06 14:42:00	2016-01-06 15:49:00	Business	Fort Pierce	West Palm Beach	63.7	Customer Visit	2016-01-06	14.0	Afternoon

In [16]:
```
dataset.dropna(inplace = True)
```

In [17]:
```
dataset.shape
```

Out[17]:
```
(413, 10)
```

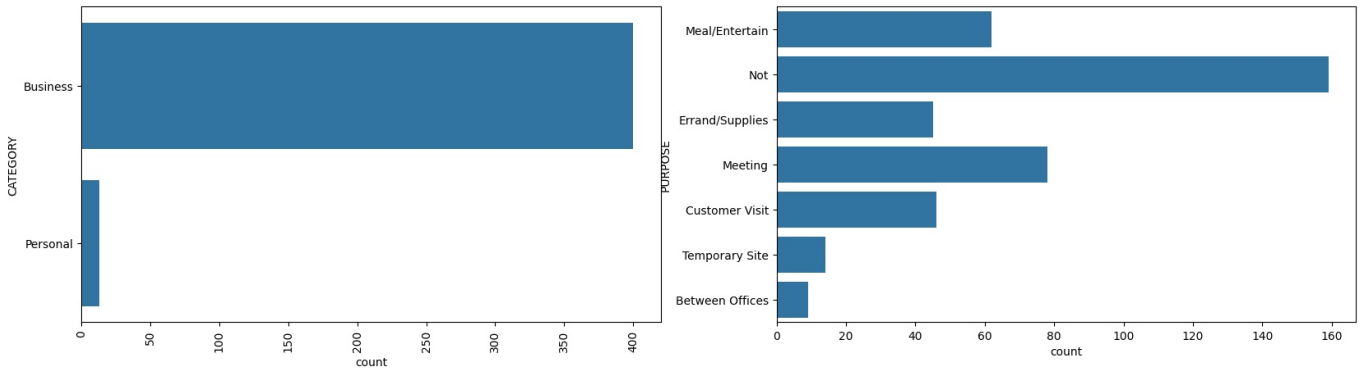
In [18]:
```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 413 entries, 0 to 1047
Data columns (total 10 columns):
 #   Column      Non-Null Count  Dtype
---  ------      --------------  -----
 0   START_DATE  413 non-null    datetime64[ns]
 1   END_DATE    413 non-null    datetime64[ns]
 2   CATEGORY    413 non-null    object
 3   START       413 non-null    object
 4   STOP        413 non-null    object
 5   MILES       413 non-null    float64
 6   PURPOSE     413 non-null    object
 7   Date        413 non-null    object
 8   Time        413 non-null    float64
 9   Day-Night   413 non-null    category
dtypes: category(1), datetime64[ns](2), float64(2), object(5)
memory usage: 32.9+ KB
```

Data Visualization

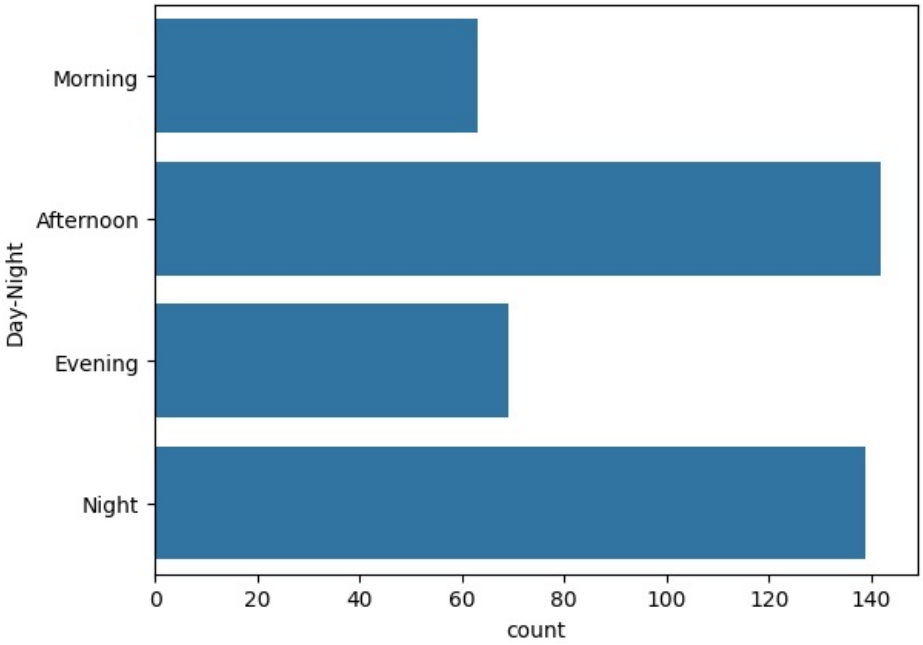
In [19]:
```
plt.figure(figsize=(20,5))

plt.subplot(1,2,1)

sns.countplot(dataset['CATEGORY'])
plt.xticks(rotation = 90)

plt.subplot(1,2,2)

sns.countplot(dataset['PURPOSE'])
```

Out[19]:
```
<Axes: xlabel='count', ylabel='PURPOSE'>
```



In [20]:
```
sns.countplot(dataset['Day-Night'])
```

Out[20]:
```
<Axes: xlabel='count', ylabel='Day-Night'>
```



In [21]:
```
dataset['MONTH'] = pd.DatetimeIndex(dataset['START_DATE']).month

month_label = {1.0: 'Jan', 2.0: 'Feb', 3.0: 'Mar', 4.0: 'April',
               5.0: 'May', 6.0: 'June', 7.0: 'July', 8.0: 'Aug',
               9.0: 'Sep', 10.0: 'Oct', 11.0: 'Nov', 12.0: 'Dec'}

dataset['MONTH'] = dataset.MONTH.map(month_label)

mon = dataset.MONTH.value_counts(sort = False)
```

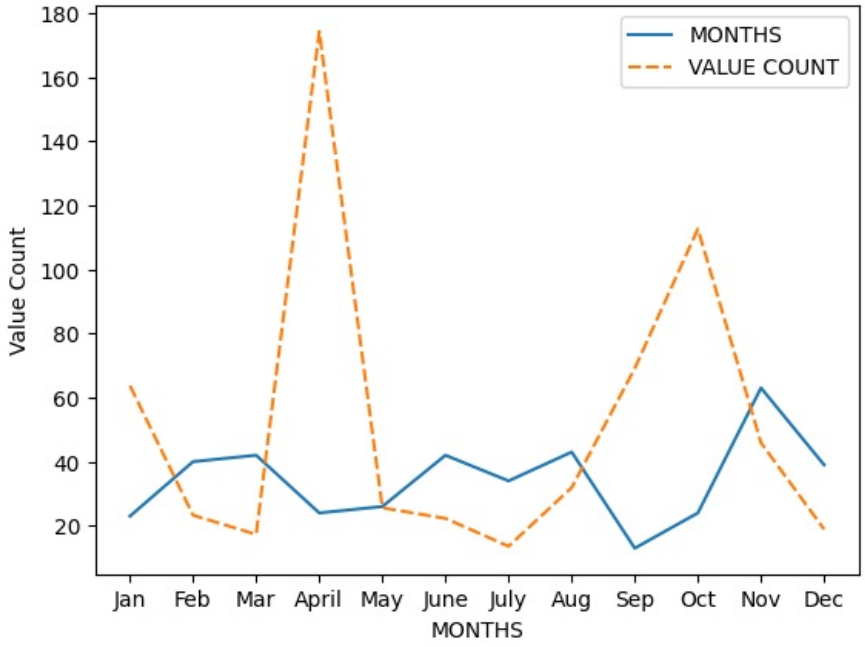
In [22]:
```
dataset.head()
```

Out[22]:

	START_DATE	END_DATE	CATEGORY	START	STOP	MILES	PURPOSE	Date	Time	Day-Night	MONTH
0	2016-01-01 21:11:00	2016-01-01 21:17:00	Business	Fort Pierce	Fort Pierce	5.1	Meal/Entertain	2016-01-01	21.0	Night	Jan
1	2016-01-02 01:25:00	2016-01-02 01:37:00	Business	Fort Pierce	Fort Pierce	5.0	Not	2016-01-02	1.0	Morning	Jan
2	2016-01-02 20:25:00	2016-01-02 20:38:00	Business	Fort Pierce	Fort Pierce	4.8	Errand/Supplies	2016-01-02	20.0	Night	Jan
3	2016-01-05 17:31:00	2016-01-05 17:45:00	Business	Fort Pierce	Fort Pierce	4.7	Meeting	2016-01-05	17.0	Evening	Jan
4	2016-01-06 14:42:00	2016-01-06 15:49:00	Business	Fort Pierce	West Palm Beach	63.7	Customer Visit	2016-01-06	14.0	Afternoon	Jan

In [23]:
```
df = pd.DataFrame({
    "MONTHS": mon.values,
    "VALUE COUNT": dataset.groupby('MONTH', sort=False)['MILES'].max()
})

p = sns.lineplot(data=df)
p.set(xlabel="MONTHS", ylabel="Value Count")
```

Out[23]:
```
[Text(0.5, 0, 'MONTHS'), Text(0, 0.5, 'Value Count')]
```



In [24]:
```
dataset['DAY'] = dataset.START_DATE.dt.weekday

day_label = {
    0: 'Mon', 1: 'Tue', 2: 'Wed', 3: 'Thur', 4: 'Fri', 5: 'Sat', 6: 'Sun'}

dataset['DAY'] = dataset['DAY'].map(day_label)
```

In [25]:
```
dataset.head()
```

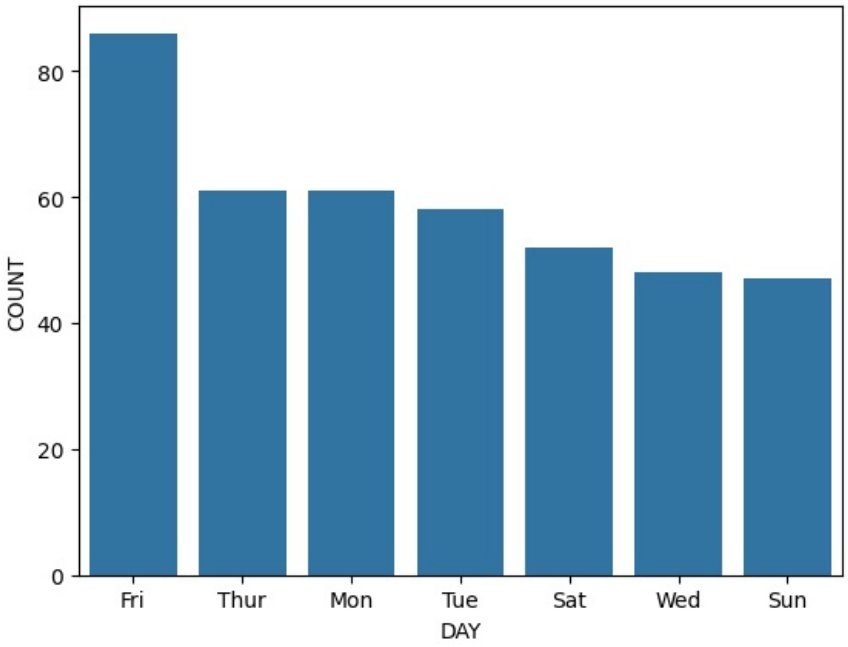
Out[25]:

	START_DATE	END_DATE	CATEGORY	START	STOP	MILES	PURPOSE	Date	Time	Day-Night	MONTH	DAY
0	2016-01-01 21:11:00	2016-01-01 21:17:00	Business	Fort Pierce	Fort Pierce	5.1	Meal/Entertain	2016-01-01	21.0	Night	Jan	Fri
1	2016-01-02 01:25:00	2016-01-02 01:37:00	Business	Fort Pierce	Fort Pierce	5.0	Not	2016-01-02	1.0	Morning	Jan	Sat
2	2016-01-02 20:25:00	2016-01-02 20:38:00	Business	Fort Pierce	Fort Pierce	4.8	Errand/Supplies	2016-01-02	20.0	Night	Jan	Sat
3	2016-01-05 17:31:00	2016-01-05 17:45:00	Business	Fort Pierce	Fort Pierce	4.7	Meeting	2016-01-05	17.0	Evening	Jan	Tue
4	2016-01-06 14:42:00	2016-01-06 15:49:00	Business	Fort Pierce	West Palm Beach	63.7	Customer Visit	2016-01-06	14.0	Afternoon	Jan	Wed

In [26]:
```
day_label = dataset.DAY.value_counts()

sns.barplot(x=day_label.index, y= day_label)
plt.xlabel('DAY')
```

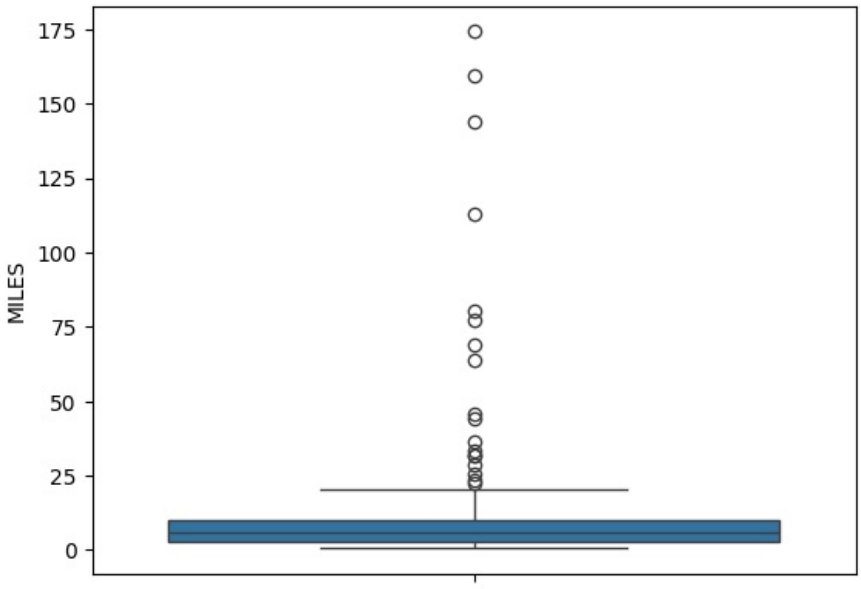
```
plt.ylabel('COUNT')
```

Out[26]:
```
Text(0, 0.5, 'COUNT')
```



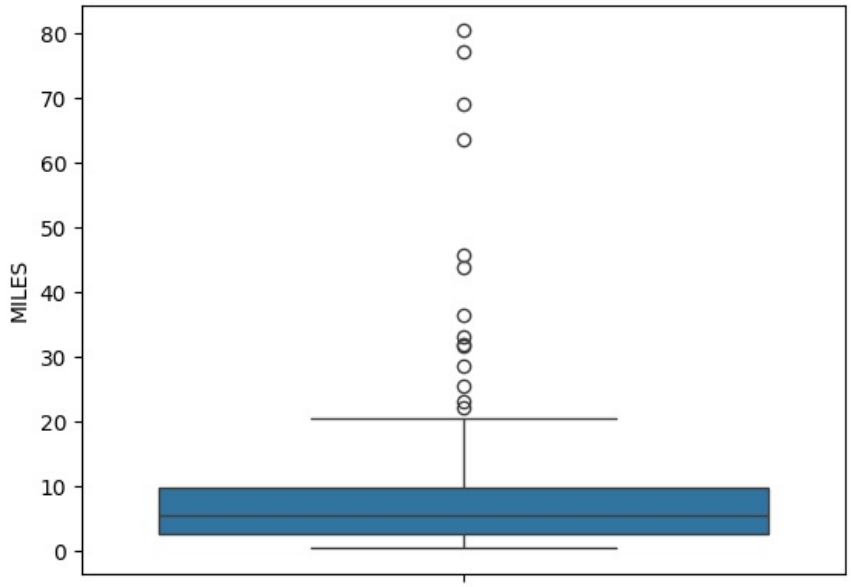
In [27]:
```
sns.boxplot(dataset['MILES'])
```

Out[27]:
```
<Axes: ylabel='MILES'>
```



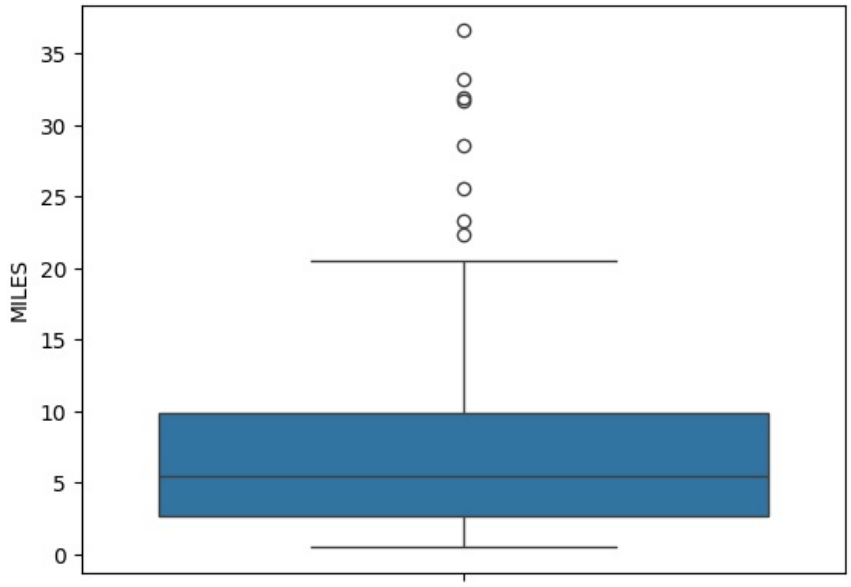
In [28]:
```
sns.boxplot(dataset[dataset['MILES']<100]['MILES'])
```

Out[28]:
```
<Axes: ylabel='MILES'>
```



In [29]:
```
sns.boxplot(dataset[dataset['MILES']<40]['MILES'])
```

Out[29]: <Axes: ylabel='MILES'>



In [30]:
```
sns.distplot(dataset[dataset['MILES']<40]['MILES'])
```

Out[30]: <Axes: xlabel='MILES', ylabel='Density'>