Statement of the business task

- How do annual members and casual riders use Cyclistic bikes different?
- Why would casual riders buy Cyclistic annual memberships?
- How can Cyclistic use digital media to influence casual riders to become members?

A description of all data sources used

- https://divvy-tripdata.s3.amazonaws.com/index.html

Summary of analysis

- Members spend almost **twice** as long on the bike as Casual riders
- Both spend the most time at night and during the weekend **(this seems obvious)**
- Increase ridership by **reducing fare of Members during peak hours and advertise this as a benefit**
- Bundle discounts to restaurants and bars with membership
- Make contests on social media with members who promote brand
- Send evangelists to weekend events to promote brand

Documentation of any cleaning or manipulation of data

- move data files out of subdirectories into a main directory
- this step is only completed once

- import os

- import shutil
- src_dir = "C:/The Goods/Financial Analysis/Python/Google/Google Case Study/Data"
- dst_dir = "C:/The Goods/Financial Analysis/Python/Google/Google Case Study/csv"
- for root, dirs, files in os.walk(src_dir): for f in files:

```
if f.endswith('.csv'):
    shutil.copy(os.path.join(root,f), dst_dir)
```

In [2]:

```
#import libraries
import pandas as pd
import seaborn as sns
import matplotlib as mpl
import matplotlib.pyplot as plt
from matplotlib.ticker import FuncFormatter
import glob
import os
import numpy as np

import datetime
import time

sns.set()
pal = sns.hls_palette(10, h=.5)
sns.set_palette(pal)

pd.set_option('display.max_rows', 100)
pd.set_option('display.expand_frame_repr', False)
```

In [3]:

```
def current_path():
    print("Current working directory before")
    print(os.getcwd())
    print()

# Driver's code
# Printing CWD before
current_path()

# Changing the CWD
os.chdir('C:/The Goods/Financial Analysis/Python/Google/Google Case Study/csv/')

# Printing CWD after
current_path()
```

```
Current working directory before
C:\The Goods\Financial Analysis\Python\Google\Google Case Study

Current working directory before
C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv
```

In [4]:

```
# use glob to get all the csv files
# in the folder

path = os.getcwd()
csv_files = glob.glob(os.path.join(path, "*.csv"))


# loop over the list of csv files
for f in csv_files:

    # read the csv file
    df = pd.read_csv(f)

    # print the location and filename
    print('Location:', f)
    print('File Name:', f.split("\\")[-1])

    # print the content
    print('Content:')
    display(df)
    print()
```

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\202004-divvy-tripdata.csv
File Name: 202004-divvy-tripdata.csv
Content:

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_lat
0	A847FADBBC638E45	docked_bike	2020-04-26 17:45:14	2020-04-26 18:12:03	Eckhart Park	86	Lincoln Ave & Diversey Pkwy	152.0	41.8964
1	5405B80E996FF60D	docked_bike	2020-04-17 17:08:54	2020-04-17 17:17:03	Drake Ave & Fullerton Ave	503	Kosciuszko Park	499.0	41.9244
2	5DD24A79A4E006F4	docked_bike	2020-04-01 17:54:13	2020-04-01 18:08:36	McClurg Ct & Erie St	142	Indiana Ave & Roosevelt Rd	255.0	41.8945
3	2A59BBDF5CDBA725	docked_bike	2020-04-07 12:50:19	2020-04-07 13:02:31	California Ave & Division St	216	Wood St & Augusta Blvd	657.0	41.9030
4	27AD306C119C6158	docked_bike	2020-04-18 10:22:59	2020-04-18 11:15:54	Rush St & Hubbard St	125	Sheridan Rd & Lawrence Ave	323.0	41.8902
...	...	...	...	...	...	...	...	...	...
84771	200E9CDFC5685AA0	docked_bike	2020-04-16 16:10:16	2020-04-16 16:23:11	Dearborn Pkwy & Delaware Pl	140	Dearborn Pkwy & Delaware Pl	140.0	41.8990
84772	F58A8F2ABCB5D95B	docked_bike	2020-04-30 17:56:12	2020-04-30 18:15:21	Kimbark Ave & 53rd St	322	Cottage Grove Ave & 51st St	351.0	41.7996
84773	A3754693A8064913	docked_bike	2020-04-24 19:57:33	2020-04-24 21:50:43	Sedgwick St & Schiller St	236	Wells St & Elm St	182.0	41.9076
84774	D610CAB867F78744	docked_bike	2020-04-02 17:59:55	2020-04-02 18:42:26	Damen Ave & Charleston St	310	Damen Ave & Charleston St	310.0	41.9201
84775	79634521ABE4CF69	docked_bike	2020-04-04 01:31:27	2020-04-04 01:37:27	Clybourn Ave & Division St	138	Clybourn Ave & Division St	138.0	41.9046

84776 rows × 13 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\202005-divvy-tripdata.csv
File Name: 202005-divvy-tripdata.csv
Content:

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_lat
0	0266BAD356748983	docked_bike	2020-05-27 10:03:52	2020-05-27 10:16:49	Franklin St & Jackson Blvd	36	Wabash Ave & Grand Ave	199.0	41.8773
1	7A50CCAF1EDD828F	docked_bike	2020-05-25 10:47:11	2020-05-25 11:05:40	Clark St & Wrightwood Ave	340	Clark St & Leland Ave	326.0	41.9295
2	2FFCDFDB91FE9A52	docked_bike	2020-05-02 14:11:03	2020-05-02 15:48:21	Kedzie Ave & Milwaukee Ave	260	Kedzie Ave & Milwaukee Ave	260.0	41.9296
3	58991CF1D7B5A84	docked_bike	2020-05-02 16:25:36	2020-05-02 16:39:28	Clarendon Ave & Leland Ave	251	Lake Shore Dr & Wellington Ave	157.0	41.9680
4	A79651EFECC268CD	docked_bike	2020-05-29 12:49:54	2020-05-29 13:27:11	Hermitage Ave & Polk St	261	Halsted St & Archer Ave	206.0	41.8715
...	...	...	...	...	...	...	...	...	...
200269	11C316914A7AF2F9	docked_bike	2020-05-30 12:48:07	2020-05-30 13:28:59	Michigan Ave & 8th St	623	Broadway & Barry Ave	300.0	41.8728
200270	DEA1A88A86A5E995	docked_bike	2020-05-30 20:21:32	2020-05-30 20:57:21	Michigan Ave & Jackson Blvd	284	Calumet Ave & 35th St	335.0	41.8779
200271	D9E8C47F8C82B86E	docked_bike	2020-05-24 11:27:42	2020-05-24 11:35:20	Larrabee St & Webster Ave	144	Racine Ave & Wrightwood Ave	343.0	41.9218
200272	9744AA400432C99D	docked_bike	2020-05-06 17:18:46	2020-05-06 17:55:34	Clark St & Berwyn Ave	463	Damen Ave & Foster Ave	464.0	41.9780
200273	FA5888D38B2B3C83	docked_bike	2020-05-25 18:01:00	2020-05-25 18:40:25	Streeter Dr & Grand Ave	35	Cannon Dr & Fullerton Ave	34.0	41.8923

200274 rows × 13 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\202006-divvy-tripdata.csv
File Name: 202006-divvy-tripdata.csv
Content:

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_lat
0	8CD5DE2C2B6C4CFC	docked_bike	2020-06-13 23:24:48	2020-06-13 23:36:55	Wilton Ave & Belmont Ave	117	Damen Ave & Clybourn Ave	163.0	41.9401
1	9A191EB2C751D85D	docked_bike	2020-06-26 07:26:10	2020-06-26 07:31:58	Federal St & Polk St	41	Daley Center Plaza	81.0	41.8720
2	F37D14B0B5659BCF	docked_bike	2020-06-23 17:12:41	2020-06-23 17:21:14	Daley Center Plaza	81	State St & Harrison St	5.0	41.8842
3	C41237B506E85FA1	docked_bike	2020-06-20 01:09:35	2020-06-20 01:28:24	Broadway & Cornelia Ave	303	Broadway & Berwyn Ave	294.0	41.9455
4	485183B0BDA7787C	docked_bike	2020-06-25 16:59:25	2020-06-25 17:08:48	Sheffield Ave & Webster Ave	327	Wilton Ave & Belmont Ave	117.0	41.9215
...	...	...	...	...	...	...	...	...	...
343000	52FD068FC638E369	docked_bike	2020-06-23 07:34:49	2020-06-23 07:58:57	Western Ave & Division St	305	Canal St & Jackson Blvd	75.0	41.9028
343001	E12633EE99DA7CC7	docked_bike	2020-06-13 14:23:02	2020-06-13 14:45:20	Broadway & Cornelia Ave	303	Wells St & Concord Ln	289.0	41.9455
343002	BCDB84E21D8509D3	docked_bike	2020-06-16 16:55:53	2020-06-16 17:12:42	Kingsbury St & Kinzie St	133	Clark St & Lincoln Ave	141.0	41.8891
343003	AE90AFD2AD1384B1	docked_bike	2020-06-24 16:12:23	2020-06-24 16:24:56	Canal St & Jackson Blvd	75	Stetson Ave & South Water St	264.0	41.8772
343004	998C129DBA742467	docked_bike	2020-06-06 15:21:50	2020-06-06 15:43:45	Wells St & Elm St	182	Sheffield Ave & Wellington Ave	115.0	41.9032

343005 rows × 13 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\202007-divvy-tripdata.csv
File Name: 202007-divvy-tripdata.csv
Content:

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_lat
0	762198876D69004D	docked_bike	2020-07-09 15:22:02	2020-07-09 15:25:52	Ritchie Ct & Banks St	180.0	Wells St & Evergreen Ave	291.0	41.9068
1	BEC9C9FBA0D4CF1B	docked_bike	2020-07-24 23:56:30	2020-07-25 00:20:17	Halsted St & Roscoe St	299.0	Broadway & Ridge Ave	461.0	41.9436
2	D2FD8EA432C77EC1	docked_bike	2020-07-08 19:49:07	2020-07-08 19:56:22	Lake Shore Dr & Diversey Pkwy	329.0	Clark St & Wellington Ave	156.0	41.9325
3	54AE594E20B35881	docked_bike	2020-07-17 19:06:42	2020-07-17 19:27:38	LaSalle St & Illinois St	181.0	Clark St & Armitage Ave	94.0	41.8907
4	54025FDC7440B56F	docked_bike	2020-07-04 10:39:57	2020-07-04 10:45:05	Lake Shore Dr & North Blvd	268.0	Clark St & Schiller St	301.0	41.9117
...	...	...	...	...	...	...	...	...	...
551475	C6D18D53DF18817E	docked_bike	2020-07-12 13:07:03	2020-07-12 13:24:45	Broadway & Barry Ave	300.0	Lake Shore Dr & North Blvd	268.0	41.9375
551476	972AFD72E2CAFAC8	docked_bike	2020-07-08 22:20:07	2020-07-08 23:44:20	Michigan Ave & Jackson Blvd	284.0	Michigan Ave & Jackson Blvd	284.0	41.8778
551477	D78F2AD0592D884F	docked_bike	2020-07-18 21:52:00	2020-07-18 22:09:41	Lincoln Ave & Belle Plaine Ave	298.0	Halsted St & Wrightwood Ave	349.0	41.9560
551478	7CE0C2DB6D70727D	docked_bike	2020-07-20 17:32:52	2020-07-20 18:00:42	Evanston Civic Center	661.0	Evanston Civic Center	661.0	42.0570
551479	883870018497B950	docked_bike	2020-07-05 16:45:31	2020-07-05 17:41:34	Indiana Ave & Roosevelt Rd	255.0	Lake Shore Dr & North Blvd	268.0	41.8678

551480 rows × 13 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\202008-divvy-tripdata.csv
File Name: 202008-divvy-tripdata.csv
Content:

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_lat
0	322BD23D287743ED	docked_bike	2020-08-20 18:08:14	2020-08-20 18:17:51	Lake Shore Dr & Diversey Pkwy	329.0	Clark St & Lincoln Ave	141.0	41.9325
1	2A3AEF1AB9054D8B	electric_bike	2020-08-27 18:46:04	2020-08-27 19:54:51	Michigan Ave & 14th St	168.0	Michigan Ave & 14th St	168.0	41.8643
2	67DC1D133E8B5816	electric_bike	2020-08-26 19:44:14	2020-08-26 21:53:07	Columbus Dr & Randolph St	195.0	State St & Randolph St	44.0	41.8846
3	C79F8BD412E578A7	electric_bike	2020-08-27 12:05:41	2020-08-27 12:53:45	Daley Center Plaza	81.0	State St & Kinzie St	47.0	41.8840
4	13814D3D661ECADB	electric_bike	2020-08-20 16:49:02	2020-08-20 16:59:49	Leavitt St & Division St	658.0	Leavitt St & Division St	658.0	41.9029
...	...	...	...	...	...	...	...	...	...
622356	8EC1D79A2DC85C83	docked_bike	2020-08-05 23:22:37	2020-08-05 23:31:33	LaSalle Dr & Huron St	627.0	Desplaines St & Randolph St	96.0	41.8948
622357	FC8D288D87A09811	docked_bike	2020-08-08 23:42:41	2020-08-08 23:49:00	McClurg Ct & Erie St	142.0	McClurg Ct & Erie St	142.0	41.8945
622358	227879168CFC40A5	docked_bike	2020-08-29 07:27:19	2020-08-29 07:54:26	Ogden Ave & Congress Pkwy	122.0	May St & Taylor St	22.0	41.8750
622359	340590910A83862F	docked_bike	2020-08-04 19:43:13	2020-08-04 21:48:11	Vincennes Ave & 75th St	568.0	Green St & Randolph St	112.0	41.7579
622360	682D968181DDEAAA	docked_bike	2020-08-13 21:15:16	2020-08-13 21:29:01	Larrabee St & Webster Ave	144.0	Clark St & Newport St	632.0	41.9218

622361 rows × 13 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\202009-divvy-tripdata.csv
File Name: 202009-divvy-tripdata.csv
Content:

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_lat
0	2B22BD5F95FB2629	electric_bike	2020-09-17 14:27:11	2020-09-17 14:44:24	Michigan Ave & Lake St	52.0	Green St & Randolph St	112.0	41.8866
1	A7FB70B4AFC6CAF2	electric_bike	2020-09-17 15:07:31	2020-09-17 15:07:45	W Oakdale Ave & N Broadway	NaN	W Oakdale Ave & N Broadway	NaN	41.9400
2	86057FA01BAC778E	electric_bike	2020-09-17 15:09:04	2020-09-17 15:09:35	W Oakdale Ave & N Broadway	NaN	W Oakdale Ave & N Broadway	NaN	41.9400
3	57F6DC9A153DB98C	electric_bike	2020-09-17 18:10:46	2020-09-17 18:35:49	Ashland Ave & Belle Plaine Ave	246.0	Montrose Harbor	249.0	41.9560
4	B9C4712F78C1AE68	electric_bike	2020-09-17 15:16:13	2020-09-17 15:52:55	Fairbanks Ct & Grand Ave	24.0	Fairbanks Ct & Grand Ave	24.0	41.8918
...	...	...	...	...	...	...	...	...	...
532953	151752B99EA40774	electric_bike	2020-09-26 12:24:38	2020-09-26 12:37:41	Damen Ave & Wellington Ave	162.0	Campbell Ave & Montrose Ave	482.0	41.9358
532954	D022E7106FFA648C	electric_bike	2020-09-26 17:19:04	2020-09-26 17:39:26	Torrence Ave & 106th St	707.0	NaN	NaN	41.7028
532955	16F6F14FE158E720	electric_bike	2020-09-26 17:58:15	2020-09-26 18:43:59	NaN	NaN	Torrence Ave & 106th St	707.0	41.7200
532956	FA6D0FE576341B6B	electric_bike	2020-09-25 19:21:53	2020-09-25 20:37:06	Stockton Dr & Wrightwood Ave	324.0	NaN	NaN	41.9312
532957	A48C9D5A2A7DCA34	electric_bike	2020-09-26 16:57:55	2020-09-26 17:31:20	State St & Kinzie St	47.0	Halsted St & Roscoe St	299.0	41.8892

532958 rows × 13 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\202010-divvy-tripdata.csv
File Name: 202010-divvy-tripdata.csv
Content:

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_lat
0	ACB6B40CF5B9044C	electric_bike	2020-10-31 19:39:43	2020-10-31 19:57:12	Lakeview Ave & Fullerton Pkwy	313.0	Rush St & Hubbard St	125.0	41.9261
1	DF450C72FD109C01	electric_bike	2020-10-31 23:50:08	2020-11-01 00:04:16	Southport Ave & Waveland Ave	227.0	Kedzie Ave & Milwaukee Ave	260.0	41.9481
2	B6396B54A15AC0DF	electric_bike	2020-10-31 23:00:01	2020-10-31 23:08:22	Stony Island Ave & 67th St	102.0	University Ave & 57th St	423.0	41.7734
3	44A4AEE261B9E854	electric_bike	2020-10-31 22:16:43	2020-10-31 22:19:35	Clark St & Grace St	165.0	Broadway & Sheridan Rd	256.0	41.9508
4	10B7DD76A6A2EB95	electric_bike	2020-10-31 19:38:19	2020-10-31 19:54:32	Southport Ave & Wrightwood Ave	190.0	Stave St & Armitage Ave	185.0	41.9288
...	...	...	...	...	...	...	...	...	...
388648	73F13E3E24954C57	docked_bike	2020-10-28 08:31:24	2020-10-28 08:37:50	Leavitt St & Division St	658.0	Wood St & Augusta Blvd	657.0	41.9029
388649	6F6B6F5704E2C08	docked_bike	2020-10-06 10:04:49	2020-10-06 10:13:25	Aberdeen St & Jackson Blvd	21.0	Loomis St & Lexington St	320.0	41.8777
388650	79C12697BEBF5B0A	docked_bike	2020-10-15 06:54:49	2020-10-15 07:22:23	California Ave & Altgeld St	502.0	California Ave & Altgeld St	502.0	41.9266
388651	907E1016BC2F53FE	docked_bike	2020-10-16 10:29:59	2020-10-16 10:50:10	Lincoln Ave & Diversey Pkwy	152.0	Ashland Ave & Blackhawk St	333.0	41.9322
388652	A12644A5B2CA6B4E	docked_bike	2020-10-31 20:13:00	2020-10-31 20:24:28	Clark St & Newport St	632.0	Clark St & Winnemac Ave	325.0	41.9445

388653 rows × 13 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\202011-divvy-tripdata.csv
File Name: 202011-divvy-tripdata.csv
Content:

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_lat
0	8D0A6FF6FFF9B921	electric_bike	2020-11-01 13:36:00	2020-11-01 13:45:40	Dearborn St & Erie St	110.0	St. Clair St & Erie St	211.0	41.8941
1	96A7A7A4BDE4F82D	electric_bike	2020-11-01 10:03:26	2020-11-01 10:14:45	Franklin St & Illinois St	672.0	Noble St & Milwaukee Ave	29.0	41.8909
2	C61526D06582BDC5	electric_bike	2020-11-01 00:34:05	2020-11-01 01:03:06	Lake Shore Dr & Monroe St	76.0	Federal St & Polk St	41.0	41.8809
3	E33389C32080B9E	electric_bike	2020-11-01 00:45:16	2020-11-01 00:54:31	Leavitt St & Chicago Ave	659.0	Stave St & Armitage Ave	185.0	41.8954
4	1C9F4EF1BC16BC60	electric_bike	2020-11-01 15:43:25	2020-11-01 16:16:52	Buckingham Fountain	2.0	Buckingham Fountain	2.0	41.8764
...	...	...	...	...	...	...	...	...	...
259711	A9FA0D09B7E7622B	electric_bike	2020-11-20 17:09:08	2020-11-20 17:13:31	Wentworth Ave & Cermak Rd	120.0	Michigan Ave & 18th St	273.0	41.8530
259712	4C5FE357D0F8F982	electric_bike	2020-11-02 18:53:59	2020-11-02 19:01:03	Michigan Ave & 18th St	273.0	Indiana Ave & 26th St	147.0	41.8578
259713	46B671054291F25E3	electric_bike	2020-11-07 19:05:03	2020-11-07 19:36:00	Lake Shore Dr & Monroe St	76.0	Theater on the Lake	177.0	41.8809
259714	2830FAF63F52A386	electric_bike	2020-11-08 11:47:53	2020-11-08 12:12:17	Michigan Ave & 18th St	273.0	Michigan Ave & 18th St	273.0	41.8578
259715	1F63CF7DB9DB92BF	electric_bike	2020-11-07 11:44:43	2020-11-07 11:53:14	Lincoln Ave & Sunnyside Ave	243.0	Lincoln Ave & Belle Plaine Ave	298.0	41.9630

259716 rows × 13 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\202012-divvy-tripdata.csv
File Name: 202012-divvy-tripdata.csv
Content:

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_lat
0	70B6A9A437D4C30D	classic_bike	2020-12-27 12:44:29	2020-12-27 12:55:06	Aberdeen St & Jackson Blvd	13157	Desplaines St & Kinzie St	TA1306000003	41.8777
1	158A465D4E74C54A	electric_bike	2020-12-18 17:37:15	2020-12-18 17:44:19	NaN	NaN	NaN	NaN	41.9300
2	5262016E0F1F299A	electric_bike	2020-12-15 15:04:33	2020-12-15 15:11:28	NaN	NaN	NaN	NaN	41.9100
3	BE119628E44F871E	electric_bike	2020-12-15 15:54:18	2020-12-15 16:00:11	NaN	NaN	NaN	NaN	41.9200
4	69AF78D57854E110	electric_bike	2020-12-22 12:08:17	2020-12-22 12:10:59	NaN	NaN	NaN	NaN	41.8800
...	...	...	...	...	...	...	...	...	...
131568	4631E9568CEA738	classic_bike	2020-12-19 13:59:33	2020-12-19 14:03:21	Rhodes Ave & 32nd St	13215	Indiana Ave & 31st St	TA1308000036	41.8362
131569	D17CBEDEA0DBDFF6	classic_bike	2020-12-20 15:48:41	2020-12-20 15:52:14	Rhodes Ave & 32nd St	13215	Indiana Ave & 31st St	TA1308000036	41.8367
131570	447A6C67E9AF962E	classic_bike	2020-12-02 16:59:58	2020-12-02 17:08:28	Rhodes Ave & 32nd St	13215	Indiana Ave & 31st St	TA1308000036	41.8362
131571	F558C17E95751C62	classic_bike	2020-12-18 18:06:52	2020-12-18 18:09:53	Rhodes Ave & 32nd St	13215	Indiana Ave & 31st St	TA1308000036	41.8367
131572	E1888F4B2740EA12	classic_bike	2020-12-03 09:43:42	2020-12-03 09:47:14	Rhodes Ave & 32nd St	13215	Indiana Ave & 31st St	TA1308000036	41.8367

131573 rows × 13 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\202101-divvy-tripdata.csv
File Name: 202101-divvy-tripdata.csv
Content:

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_lat
0	E19E6F1B8D4C42ED	electric_bike	2021-01-23 16:14:19	2021-01-23 16:24:44	California Ave & Cortez St	17660	NaN	NaN	41.9003
1	DC88F20C2C55F27F	electric_bike	2021-01-27 18:43:08	2021-01-27 18:47:12	California Ave & Cortez St	17660	NaN	NaN	41.9003
2	EC45C94683FE3F27	electric_bike	2021-01-21 22:35:54	2021-01-21 22:37:14	California Ave & Cortez St	17660	NaN	NaN	41.9003
3	4FA453A75AE377DB	electric_bike	2021-01-07 13:31:13	2021-01-07 13:42:55	California Ave & Cortez St	17660	NaN	NaN	41.9003
4	BE5E8EB4E7263A0B	electric_bike	2021-01-23 02:24:02	2021-01-23 02:24:45	California Ave & Cortez St	17660	NaN	NaN	41.9003
...	...	...	...	...	...	...	...	...	...
96829	B1A5336E1412D88F	classic_bike	2021-01-19 19:03:17	2021-01-19 20:10:03	Lake Shore Dr & Monroe St	13300	Lakefront Trail & Bryn Mawr Ave	KA1504000152	41.8809
96830	576A5CB7DCD759D0	classic_bike	2021-01-05 18:42:27	2021-01-05 19:33:33	Lake Shore Dr & Monroe St	13300	Lakefront Trail & Bryn Mawr Ave	KA1504000152	41.8809
96831	B1B319AB7BCC9B4C	classic_bike	2021-01-17 17:59:47	2021-01-17 19:34:03	Lakefront Trail & Bryn Mawr Ave	KA1504000152	Lake Shore Dr & Monroe St	13300	41.9840
96832	6DB04151565CE0E3	classic_bike	2021-01-06 19:20:31	2021-01-06 20:41:57	Lakefront Trail & Bryn Mawr Ave	KA1504000152	Lake Shore Dr & Monroe St	13300	41.9840
96833	8008C9C998083A1A	docked_bike	2021-01-13 13:20:02	2021-01-17 14:17:00	Lake Shore Dr & Monroe St	13300	Lake Shore Dr & Monroe St	13300	41.8809

96834 rows × 13 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\202103-divvy-tripdata.csv
File Name: 202103-divvy-tripdata.csv
Content:

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_lat
0	CFA86D4455AA1030	classic_bike	2021-03-16 08:32:30	2021-03-16 08:36:34	Humboldt Blvd & Armitage Ave	15651	Stave St & Armitage Ave	13266	41.9175
1	30D9DC61227D1AF3	classic_bike	2021-03-28 01:26:28	2021-03-28 01:36:55	Humboldt Blvd & Armitage Ave	15651	Central Park Ave & Bloomingdale Ave	18017	41.9175
2	846D87A15682A284	classic_bike	2021-03-11 21:17:29	2021-03-11 21:33:53	Shields Ave & 28th Pl	15443	Halsted St & 35th St	TA1308000043	41.8427
3	994D05AA75A168F2	classic_bike	2021-03-11 13:26:42	2021-03-11 13:55:41	Winthrop Ave & Lawrence Ave	TA1308000021	Broadway & Sheridan Rd	13323	41.9688
4	DF7464FBE92DB30B	classic_bike	2021-03-21 09:09:37	2021-03-21 09:27:33	Glenwood Ave & Touhy Ave	525	Chicago Ave & Sheridan Rd	E008	42.0127
...	...	...	...	...	...	...	...	...	...
228491	9397BDD14798A18A	docked_bike	2021-03-20 14:58:56	2021-03-20 17:22:47	Michigan Ave & Oak St	13042	New St & Illinois St	TA1306000013	41.9009
228492	B88EB8D51AAD40DA	classic_bike	2021-03-02 11:35:10	2021-03-02 11:43:37	Kingsbury St & Kinzie St	KA1503000043	New St & Illinois St	TA1306000013	41.8891
228493	637FF754DA08D9E1	classic_bike	2021-03-09 11:07:36	2021-03-09 11:49:11	Michigan Ave & Oak St	13042	Clark St & Berwyn Ave	KA1504000146	41.9009
228494	F8F43AD8978A7A35	classic_bike	2021-03-01 18:11:57	2021-03-01 18:18:37	Kingsbury St & Kinzie St	KA1503000043	New St & Illinois St	TA1306000013	41.8891
228495	3A6640A5BF43CF72	electric_bike	2021-03-26 17:58:14	2021-03-26 18:06:43	NaN	NaN	New St & Illinois St	TA1306000013	41.8800

228496 rows × 13 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Stations_2013.csv
File Name: Divvy_Stations_2013.csv
Content:

	id	name	latitude	longitude	dpcapacity	landmark	online date
0	5	State St & Harrison St	41.873958	-87.627739	19	30	6/28/2013
1	13	Wilton Ave & Diversey Pkwy	41.932500	-87.652681	19	66	6/28/2013
2	14	Morgan St & 18th St	41.858086	-87.651073	15	163	6/28/2013
3	15	Racine Ave & 18th St	41.858181	-87.656487	15	164	6/28/2013
4	16	Wood St & North Ave	41.910329	-87.672516	15	223	8/12/2013
...	...	...	...	...	...	...	...
295	347	Ashland Ave & Grace St	41.950687	-87.668700	15	319	10/12/2013
296	348	California Ave & 21st St	41.854016	-87.695445	15	96	10/14/2013
297	349	Halsted St & Wrightwood Ave	41.929143	-87.649077	15	210	10/28/2013
298	350	Ashland Ave & Chicago Ave	41.895966	-87.667747	15	247	10/22/2013
299	351	Cottage Grove Ave & 51st St	41.803038	-87.606615	15	440	10/17/2013

300 rows × 7 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Stations_2014-Q3Q4.csv
File Name: Divvy_Stations_2014-Q3Q4.csv
Content:

	id	name	latitude	longitude	dpcapacity	dateCreated
0	5	State St & Harrison St	41.873958	-87.627739	19	6/10/2013 10:46
1	13	Wilton Ave & Diversey Pkwy	41.932500	-87.652681	19	6/22/2013 18:29
2	14	Morgan St & 18th St	41.858086	-87.651073	15	6/22/2013 18:33
3	15	Racine Ave & 18th St	41.858181	-87.656487	15	6/22/2013 18:35
4	16	Wood St & North Ave	41.910329	-87.672516	15	6/22/2013 18:55
...	...	...	...	...	...	...
295	347	Ashland Ave & Grace St	41.950687	-87.668700	15	10/4/2013 16:06
296	348	California Ave & 21st St	41.854016	-87.695445	15	10/9/2013 16:13
297	349	Halsted St & Wrightwood Ave	41.929143	-87.649077	15	10/10/2013 12:40
298	350	Ashland Ave & Chicago Ave	41.895966	-87.667747	15	10/10/2013 14:22
299	351	Cottage Grove Ave & 51st St	41.803038	-87.606615	15	10/10/2013 16:56

300 rows × 6 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Stations_2016_Q3.csv
File Name: Divvy_Stations_2016_Q3.csv
Content:

	id	name	latitude	longitude	dpcapacity	online_date
0	456	2112 W Peterson Ave	41.991178	-87.683593	15	5/12/2015
1	101	63rd St Beach	41.781016	-87.576120	23	4/20/2015
2	109	900 W Harrison St	41.874675	-87.650019	19	8/6/2013
3	21	Aberdeen St & Jackson Blvd	41.877726	-87.654787	15	6/21/2013
4	80	Aberdeen St & Monroe St	41.880420	-87.655599	19	6/26/2013
...	...	...	...	...	...	...
576	317	Wood St & Taylor St	41.869154	-87.671045	23	9/21/2013
577	248	Woodlawn Ave & 55th St	41.795264	-87.596471	19	8/23/2013
578	569	Woodlawn Ave & 75th St	41.759160	-87.595751	15	6/23/2016
579	413	Woodlawn Ave & Lake Park Ave	41.814093	-87.597005	15	4/14/2015
580	396	Yates Blvd & 75th St	41.758768	-87.566440	11	5/7/2015

581 rows × 6 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Stations_2016_Q4.csv
File Name: Divvy_Stations_2016_Q4.csv
Content:

	id	name	latitude	longitude	dpcapacity	online_date
0	456	2112 W Peterson Ave	41.991178	-87.683593	15	5/12/2015
1	101	63rd St Beach	41.781016	-87.576120	23	4/20/2015
2	109	900 W Harrison St	41.874675	-87.650019	19	8/6/2013
3	21	Aberdeen St & Jackson Blvd	41.877726	-87.654787	15	6/21/2013
4	80	Aberdeen St & Monroe St	41.880420	-87.655599	19	6/26/2013
...	...	...	...	...	...	...
576	317	Wood St & Taylor St	41.869154	-87.671045	23	9/21/2013
577	248	Woodlawn Ave & 55th St	41.795264	-87.596471	19	8/23/2013
578	569	Woodlawn Ave & 75th St	41.759160	-87.595751	15	6/23/2016
579	413	Woodlawn Ave & Lake Park Ave	41.814093	-87.597005	15	4/14/2015
580	396	Yates Blvd & 75th St	41.758768	-87.566440	11	5/7/2015

581 rows × 6 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Stations_2017_Q1Q2.csv
File Name: Divvy_Stations_2017_Q1Q2.csv
Content:

	id	name	city	latitude	longitude	dpcapacity	online_date
0	456	2112 W Peterson Ave	Chicago	41.991178	-87.683593	15	2/10/2015 14:04:42
1	101	63rd St Beach	Chicago	41.781016	-87.576120	23	7/16/2013 01:27:50
2	109	900 W Harrison St	Chicago	41.874675	-87.650019	19	7/18/2013 16:45:02
3	21	Aberdeen St & Jackson Blvd	Chicago	41.877726	-87.654787	15	6/22/2013 19:07:12
4	80	Aberdeen St & Madison (Monroe) St	Chicago	41.881567	-87.655056	19	6/26/2013 19:00:18
...	...	...	...	...	...	...	...
577	610	Marion St & South Blvd	Oak Park	41.886810	-87.802870	19	6/23/2016 12:24:30
578	616	Oak Park Ave & Harrison St	Oak Park	41.872987	-87.793945	15	6/23/2016 12:27:31
579	611	Oak Park Ave & South Blvd	Oak Park	41.886923	-87.793899	19	6/23/2016 12:25:00
580	612	Ridgeland Ave & Lake St	Oak Park	41.888085	-87.785236	15	6/23/2016 12:25:30
581	613	Wisconsin Ave & Madison St	Oak Park	41.879837	-87.802240	11	6/23/2016 12:26:01

582 rows × 7 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Stations_2017_Q3Q4.csv
File Name: Divvy_Stations_2017_Q3Q4.csv
Content:

	id	name	city	latitude	longitude	dpcapacity	online_date	Unnamed: 7
0	2	Buckingham Fountain	Chicago	41.876393	-87.620328	27	6/10/2013 10:43	NaN
1	3	Shedd Aquarium	Chicago	41.867226	-87.615355	55	6/10/2013 10:44	NaN
2	4	Burnham Harbor	Chicago	41.856268	-87.613348	23	6/10/2013 10:46	NaN
3	5	State St & Harrison St	Chicago	41.874053	-87.627716	23	6/10/2013 10:46	NaN
4	6	Dusable Harbor	Chicago	41.885041	-87.612794	39	6/10/2013 11:18	NaN
...	...	...	...	...	...	...	...	...
580	622	California Ave & Cortez St	Chicago	41.900363	-87.696704	15	4/27/2017 9:17	NaN
581	623	Michigan Ave & 8th St	Chicago	41.872773	-87.623981	31	6/13/2017 15:23	NaN
582	624	Dearborn St & Van Buren St (*)	Chicago	41.876268	-87.629155	16	7/26/2017 21:25	NaN
583	625	Chicago Ave & Dempster St	Evanston	42.041691	-87.680687	15	8/11/2017 16:53	NaN
584	626	Delano Ct & Roosevelt Rd	Chicago	41.867491	-87.632190	19	12/21/2017 22:06	NaN

585 rows × 8 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2013.csv
File Name: Divvy_Trips_2013.csv
Content:

Warning: C:\Users\jeams\anaconda3\lib\site-packages\IPython\core\interactiveshell.py:3146: DtypeWarning: Columns (10) have mixed types.Specify dtype option on import or set low_memory=False.
  has_raised = await self.run_ast_nodes(code_ast.body, cell_name,

	trip_id	starttime	stoptime	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	4118	2013-06-27 12:11	2013-06-27 12:16	480	316	85	Michigan Ave & Oak St	28	Larrabee St & Menomonee St	Customer
1	4275	2013-06-27 14:44	2013-06-27 14:45	77	64	32	Racine Ave & Congress Pkwy	32	Racine Ave & Congress Pkwy	Customer
2	4291	2013-06-27 14:58	2013-06-27 15:05	77	433	32	Racine Ave & Congress Pkwy	19	Loomis St & Taylor St	Customer
3	4316	2013-06-27 15:06	2013-06-27 15:09	77	123	19	Loomis St & Taylor St	19	Loomis St & Taylor St	Customer
4	4342	2013-06-27 15:13	2013-06-27 15:27	77	852	19	Loomis St & Taylor St	55	Halsted St & James M Rochford St	Customer
...	...	...	...	...	...	...	...	...	...	...
759783	1109257	2013-12-31 21:12	2013-12-31 21:16	1917	284	20	Sheffield Ave & Kingsbury St	93	Sheffield Ave & Willow St	Subscriber
759784	1109276	2013-12-31 21:36	2013-12-31 22:01	2859	1493	227	Southport Ave & Waveland Ave	228	Damen Ave & Melrose Ave	Subscriber
759785	1109283	2013-12-31 22:03	2013-12-31 22:13	198	650	284	Michigan Ave & Jackson Blvd	43	Michigan Ave & Washington St	Subscriber
759786	1109309	2013-12-31 22:10	2013-12-31 22:16	2048	346	130	Damen Ave & Division St	69	Damen Ave & Pierce Ave	Subscriber
759787	1109338	2013-12-31 22:35	2013-12-31 22:49	2239	868	216	California Ave & Division St	69	Damen Ave & Pierce Ave	Subscriber

759788 rows × 12 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2014-Q3-07.csv
File Name: Divvy_Trips_2014-Q3-07.csv
Content:

	trip_id	starttime	stoptime	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	2886259	7/31/2014 23:56	8/1/2014 0:03	2602	386	291	Wells St & Evergreen Ave	53	Wells St & Erie St	Subscriber
1	2886258	7/31/2014 23:58	8/1/2014 0:07	2403	495	98	LaSalle St & Washington St	106	State St & Pearson St	Subscriber
2	2886257	7/31/2014 23:58	8/1/2014 2:10	669	7947	240	Sheridan Rd & Irving Park Rd	240	Sheridan Rd & Irving Park Rd	Customer
3	2886256	7/31/2014 23:58	8/1/2014 0:19	2431	1282	47	State St & Kinzie St	14	Morgan St & 18th St	Subscriber
4	2886255	7/31/2014 23:57	8/1/2014 2:10	2885	7972	240	Sheridan Rd & Irving Park Rd	240	Sheridan Rd & Irving Park Rd	Customer
...	...	...	...	...	...	...	...	...	...	...
410335	2355143	7/1/2014 0:41	7/1/2014 0:56	891	393	69	Damen Ave & Pierce Ave	214	Damen Ave & Grand Ave	Subscriber
410336	2355142	7/1/2014 0:35	7/1/2014 0:41	1432	353	342	Wolcott Ave & Polk St	214	Damen Ave & Grand Ave	Subscriber
410337	2355140	7/1/2014 0:26	7/1/2014 0:57	173	1839	194	Wabash Ave & Wacker Pl	300	Broadway & Barry Ave	Subscriber
410338	2355139	7/1/2014 0:24	7/1/2014 0:42	709	1040	49	Dearborn St & Monroe St	26	McClurg Ct & Illinois St	Subscriber
410339	2355136	7/1/2014 0:16	7/1/2014 0:29	255	836	307	Southport Ave & Clybourn Ave	350	Ashland Ave & Chicago Ave	Subscriber

410340 rows × 12 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2014-Q3-0809.csv
File Name: Divvy_Trips_2014-Q3-0809.csv
Content:

	trip_id	starttime	stoptime	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	3810750	9/30/2014 23:59	10/1/2014 0:06	851	411	177	Theater on the Lake	143	Sedgwick St & Webster Ave	Subscriber
1	3810749	9/30/2014 23:59	10/1/2014 0:01	989	142	277	Ashland Ave & Grand Ave	285	Wood St & Grand Ave	Subscriber
2	3810748	9/30/2014 23:59	10/1/2014 0:03	261	279	48	Larrabee St & Kingsbury St	110	State St & Erie St	Subscriber
3	3810746	9/30/2014 23:58	10/1/2014 0:15	806	1031	58	Marshfield Ave & Cortland St	318	Southport Ave & Irving Park Rd	Subscriber
4	3810745	9/30/2014 23:58	10/1/2014 0:05	104	437	127	Lincoln Ave & Fullerton Ave	94	Clark St & Armitage Ave	Subscriber
...	...	...	...	...	...	...	...	...	...	...
700625	2886264	8/1/2014 0:01	8/1/2014 0:20	67	1159	310	Damen Ave & Charleston St	113	Bissell St & Armitage Ave	Customer
700626	2886263	8/1/2014 0:00	8/1/2014 0:13	1452	797	330	Lincoln Ave & Addison St	239	Western Ave & Leland Ave	Subscriber
700627	2886262	8/1/2014 0:00	8/1/2014 0:05	334	1172	310	Damen Ave & Charleston St	113	Bissell St & Armitage Ave	Customer
700628	2886261	8/1/2014 0:00	8/1/2014 0:05	1645	299	166	Ashland Ave & Wrightwood Ave	152	Lincoln Ave & Diversey Pkwy	Subscriber
700629	2886260	8/1/2014 0:00	8/1/2014 0:11	2887	696	251	Clarendon Ave & Leland Ave	299	Halsted St & Roscoe St	Subscriber

700630 rows × 12 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2014-Q4.csv
File Name: Divvy_Trips_2014-Q4.csv
Content:

	trip_id	starttime	stoptime	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	4413167	12/31/2014 23:54	12/31/2014 23:57	1880	193	296	Broadway & Belmont Ave	334	Lake Shore Dr & Belmont Ave	Subscriber
1	4413166	12/31/2014 23:50	12/31/2014 23:52	1153	161	264	Stetson Ave & South Water St	44	State St & Randolph St	Subscriber
2	4413165	12/31/2014 23:48	1/1/2015 0:38	1946	3002	168	Michigan Ave & 14th St	168	Michigan Ave & 14th St	Customer
3	4413164	12/31/2014 23:46	1/1/2015 0:37	2563	3084	168	Michigan Ave & 14th St	168	Michigan Ave & 14th St	Customer
4	4413163	12/31/2014 23:44	1/1/2015 0:10	389	1570	43	Michigan Ave & Washington St	163	Damen Ave & Clybourn Ave	Subscriber
...	...	...	...	...	...	...	...	...	...	...
437960	3810756	10/1/2014 0:01	10/1/2014 0:16	1122	853	253	Clifton Ave & Lawrence Ave	114	Sheffield Ave & Waveland Ave	Subscriber
437961	3810754	10/1/2014 0:02	10/1/2014 0:10	1531	468	113	Bissell St & Armitage Ave	340	Clark St & Wrightwood Ave	Subscriber
437962	3810753	10/1/2014 0:00	10/1/2014 0:46	2707	836	332	Halsted St & Diversey Pkwy	333	Ashland Ave & Blackhawk St	Subscriber
437963	3810752	10/1/2014 0:01	10/1/2014 0:05	2059	238	92	Carpenter St & Huron St	29	Noble St & Milwaukee Ave	Subscriber
437964	3810751	10/1/2014 0:00	10/1/2014 0:09	1316	538	52	Michigan Ave & Lake St	255	Indiana Ave & Roosevelt Rd	Subscriber

437965 rows × 12 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2014_Q1Q2.csv
File Name: Divvy_Trips_2014_Q1Q2.csv
Content:

	trip_id	starttime	stoptime	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	2355134	6/30/2014 23:57	7/1/2014 0:07	2006	604	131	Lincoln Ave & Belmont Ave	303	Broadway & Cornelia Ave	Subscriber
1	2355133	6/30/2014 23:56	7/1/2014 0:00	2217	263	282	Halsted St & Maxwell St	22	May St & Taylor St	Subscriber
2	2355130	6/30/2014 23:33	6/30/2014 23:35	2798	126	327	Sheffield Ave & Webster Ave	225	Halsted St & Dickens Ave	Subscriber
3	2355129	6/30/2014 23:26	7/1/2014 0:24	173	3481	134	Peoria St & Jackson Blvd	194	State St & Wacker Dr	Subscriber
4	2355128	6/30/2014 23:16	6/30/2014 23:26	173	638	320	Loomis St & Lexington St	134	Peoria St & Jackson Blvd	Subscriber
...	...	...	...	...	...	...	...	...	...	...
905694	1109432	1/1/2014 1:43	1/1/2014 1:53	823	652	113	Bissell St & Armitage Ave	94	Clark St & Armitage Ave	Subscriber
905695	1109431	1/1/2014 1:43	1/1/2014 1:53	348	650	113	Bissell St & Armitage Ave	94	Clark St & Armitage Ave	Subscriber
905696	1109427	1/1/2014 1:12	1/1/2014 1:18	1818	346	240	Sheridan Rd & Irving Park Rd	245	Clarendon Ave & Junior Ter	Subscriber
905697	1109421	1/1/2014 0:45	1/1/2014 0:55	2981	608	69	Damen Ave & Pierce Ave	216	California Ave & Division St	Customer
905698	1109420	1/1/2014 0:17	1/1/2014 0:42	2981	1466	94	Clark St & Armitage Ave	69	Damen Ave & Pierce Ave	Customer

905699 rows × 12 columns

Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2015_07.csv
File Name: Divvy_Trips_2015_07.csv
Content:

	trip_id	starttime	stoptime	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	6611093	7/31/2015 23:59	8/1/2015 0:03	4829	197	239	Western Ave & Leland Ave	242	Damen Ave & Leland Ave	Subscriber
1	6611091	7/31/2015 23:59	8/1/2015 0:22	3747	1378	177	Theater on the Lake	312	Clarendon Ave & Gordon Ter	Subscriber
2	6611090	7/31/2015 23:59	8/1/2015 0:18	1417	1178	403	Wentworth Ave & 33rd St	150	Fort Dearborn Dr & 31st St	Customer
3	6611089	7/31/2015 23:59	8/1/2015 0:03	3829	243	287	Franklin St & Monroe St	38	Clark St & Lake St	Subscriber
4	6611088	7/31/2015 23:59	8/1/2015 0:43	3647	2656	305	Western Ave & Division St	506	Spaulding Ave & Armitage Ave	Subscriber
...	...	...	...	...	...	...	...	...	...	...
533705	5943505	7/1/2015 0:02	7/1/2015 0:09	4416	419	283	LaSalle St & Jackson Blvd	47	State St & Kinzie St	Subscriber
533706	5943504	7/1/2015 0:02	7/1/2015 0:22	856	1350	490	Troy St & Elston Ave	227	Southport Ave & Waveland Ave	Customer
533707	5943503	7/1/2015 0:02	7/1/2015 0:11	3544	422	33	State St & Van Buren St	77	Clinton St & Madison St	Subscriber
533708	5943502	7/1/2015 0:01	7/1/2015 0:23	794	1338	490	Troy St & Elston Ave	227	Southport Ave & Waveland Ave	Customer
533709	5943501	7/1/2015 0:00	7/1/2015 0:23	356	1394	490	Troy St & Elston Ave	227	Southport Ave & Waveland Ave	Customer

533711 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2015_08.csv
File Name: Divvy_Trips_2015_08.csv
Content:
```

	trip_id	starttime	stoptime	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	7221407	8/31/2015 23:59	9/1/2015 0:03	4254	245	241	Morgan St & Polk St	21	Aberdeen St & Jackson Blvd	Subscriber
1	7221406	8/31/2015 23:58	9/1/2015 0:26	431	1676	511	Albany Ave & Bloomingdale Ave	58	Marshfield Ave & Cortland St	Customer
2	7221405	8/31/2015 23:57	9/1/2015 0:06	4816	493	256	Broadway & Sheridan Rd	226	Racine Ave & Belmont Ave	Subscriber
3	7221404	8/31/2015 23:57	9/1/2015 0:05	3474	465	66	Clinton St & Lake St	110	Dearborn St & Erie St	Subscriber
4	7221403	8/31/2015 23:56	9/1/2015 0:08	1540	716	332	Halsted St & Diversey Pkwy	319	Greenview Ave & Diversey Pkwy	Subscriber
...	...	...	...	...	...	...	...	...	...	...
495024	6611098	8/1/2015 0:01	8/1/2015 0:07	4814	373	60	Dayton St & North Ave	327	Sheffield Ave & Webster Ave	Subscriber
495025	6611097	8/1/2015 0:01	8/1/2015 0:30	4602	1776	454	Broadway & Granville Ave	256	Broadway & Sheridan Rd	Subscriber
495026	6611096	8/1/2015 0:00	8/1/2015 0:13	4690	735	174	Canal St & Madison St	37	Field Blvd & South Water St	Subscriber
495027	6611095	8/1/2015 0:00	8/1/2015 0:31	372	1842	186	Ogden Ave & Race Ave	504	Campbell Ave & Fullerton Ave	Subscriber
495028	6611094	8/1/2015 0:00	8/1/2015 0:09	512	563	142	McClurg Ct & Erie St	145	Mies van der Rohe Way & Chestnut St	Customer

495029 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2015_09.csv
File Name: Divvy_Trips_2015_09.csv
Content:
```

	trip_id	starttime	stoptime	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	7745070	9/30/2015 23:59	10/1/2015 0:04	180	289	229	Southport Ave & Roscoe St	318	Southport Ave & Irving Park Rd	Subscriber
1	7745069	9/30/2015 23:59	10/1/2015 0:07	1414	476	229	Southport Ave & Roscoe St	165	Clark St & Grace St	Subscriber
2	7745068	9/30/2015 23:58	10/1/2015 0:07	1090	516	318	Southport Ave & Irving Park Rd	325	Clark St & Winnemac Ave	Subscriber
3	7745067	9/30/2015 23:58	10/1/2015 0:03	3985	323	309	Leavitt St & Armitage Ave	123	California Ave & Milwaukee Ave	Subscriber
4	7745066	9/30/2015 23:54	10/1/2015 0:09	2416	954	243	Lincoln Ave & Leavitt St	231	Sheridan Rd & Montrose Ave	Subscriber
...	...	...	...	...	...	...	...	...	...	...
427090	7221414	9/1/2015 0:03	9/1/2015 0:17	2183	824	298	Lincoln Ave & Belle Plaine Ave	472	Lincoln Ave & Winona St	Subscriber
427091	7221412	9/1/2015 0:02	9/1/2015 0:16	2242	849	234	Clark St & Montrose Ave	244	Ravenswood Ave & Irving Park Rd	Customer
427092	7221411	9/1/2015 0:01	9/1/2015 0:16	1553	869	234	Clark St & Montrose Ave	244	Ravenswood Ave & Irving Park Rd	Customer
427093	7221410	9/1/2015 0:01	9/1/2015 0:29	4366	1664	247	Shore Drive & 55th St	121	Blackstone Ave & Hyde Park Blvd	Customer
427094	7221409	9/1/2015 0:00	9/1/2015 0:15	3747	902	228	Damen Ave & Melrose Ave	69	Damen Ave & Pierce Ave	Subscriber

427095 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2015_Q4.csv
File Name: Divvy_Trips_2015_Q4.csv
Content:
```

	trip_id	starttime	stoptime	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	8547210	12/31/2015 23:48	12/31/2015 23:51	811	166	348	California Ave & 21st St	442	California Ave & 23rd Pl	Subscriber
1	8547209	12/31/2015 23:47	12/31/2015 23:53	3866	334	229	Halsted St & Roscoe St	117	Wilton Ave & Belmont Ave	Subscriber
2	8547206	12/31/2015 23:37	12/31/2015 23:43	4325	365	77	Clinton St & Madison St	38	Clark St & Lake St	Subscriber
3	8547205	12/31/2015 23:37	1/1/2016 0:02	707	1513	454	Broadway & Granville Ave	303	Broadway & Cornelia Ave	Subscriber
4	8547204	12/31/2015 23:36	12/31/2015 23:40	1928	209	141	Clark St & Lincoln Ave	301	Clark St & Schiller St	Subscriber
...	...	...	...	...	...	...	...	...	...	...
631360	7745075	10/1/2015 0:04	10/1/2015 0:39	3111	2117	26	McClurg Ct & Illinois St	85	Michigan Ave & Oak St	Subscriber
631361	7745074	10/1/2015 0:03	10/1/2015 0:20	2645	1014	20	Sheffield Ave & Kingsbury St	257	Lincoln Ave & Waveland Ave	Subscriber
631362	7745073	10/1/2015 0:01	10/1/2015 0:11	1577	580	112	Green St & Randolph St	37	State St & Kinzie St	Subscriber
631363	7745072	10/1/2015 0:01	10/1/2015 0:22	4163	1271	94	Clark St & Armitage Ave	245	Clarendon Ave & Junior Ter	Subscriber
631364	7745071	10/1/2015 0:00	10/1/2015 0:05	2278	344	283	LaSalle St & Jackson Blvd	47	State St & Kinzie St	Subscriber

631365 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2016_Q3.csv
File Name: Divvy_Trips_2016_Q3.csv
Content:
```

	trip_id	starttime	stoptime	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	12150160	9/30/2016 23:59:58	10/1/2016 00:04:03	4959	245	69	Damen Ave & Pierce Ave	17	Wood St & Division St	Subscriber
1	12150159	9/30/2016 23:59:58	10/1/2016 00:04:09	2589	251	383	Ashland Ave & Harrison St	320	Loomis St & Lexington St	Subscriber
2	12150158	9/30/2016 23:59:51	10/1/2016 00:24:51	3656	1500	302	Sheffield Ave & Wrightwood Ave	334	Lake Shore Dr & Belmont Ave	Customer
3	12150157	9/30/2016 23:59:51	10/1/2016 00:03:56	3570	245	475	Washtenaw Ave & Lawrence Ave	471	Francisco Ave & Foster Ave	Subscriber
4	12150156	9/30/2016 23:59:32	10/1/2016 00:26:50	3158	1638	302	Sheffield Ave & Wrightwood Ave	492	Leavitt St & Addison St	Customer
...	...	...	...	...	...	...	...	...	...	...
1441806	10426662	7/1/2016 00:02:30	7/1/2016 00:08:32	4225	362	294	Broadway & Berwyn Ave	458	Broadway & Thorndale Ave	Subscriber
1441807	10426661	7/1/2016 00:02:14	7/1/2016 00:31:36	1757	884	264	Stetson Ave & South Water St	168	Michigan Ave & 14th St	Customer
1441808	10426660	7/1/2016 00:02:09	7/1/2016 00:16:28	1687	860	264	Stetson Ave & South Water St	168	Michigan Ave & 14th St	Customer
1441809	10426659	7/1/2016 00:01:58	7/1/2016 00:47:30	3151	2732	177	Theater on the Lake	340	Clark St & Wrightwood Ave	Customer
1441810	10426658	7/1/2016 00:01:14	7/1/2016 00:03:37	5228	143	246	Ashland Ave & Belle Plaine Ave	292	Southport Ave & Clark St	Subscriber

1441811 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2016_Q4.csv
File Name: Divvy_Trips_2016_Q4.csv
Content:
```

	trip_id	starttime	stoptime	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	12979228	12/31/2016 23:57:52	1/1/2017 00:06:44	5076	532	502	California Ave & Altgeld St	258	Logan Blvd & Elston Ave	Customer
1	12979227	12/31/2016 23:53:18	1/1/2017 00:08:13	5114	895	195	Columbus Dr & Randolph St	25	Michigan Ave & Pearson St	Customer
2	12979226	12/31/2016 23:53:07	1/1/2017 00:08:38	1026	931	195	Columbus Dr & Randolph St	25	Michigan Ave & Pearson St	Customer
3	12979225	12/31/2016 23:51:31	1/1/2017 00:07:41	504	970	199	Wabash Ave & Grand Ave	35	Streeter Dr & Grand Ave	Customer
4	12979224	12/31/2016 23:51:31	1/1/2017 00:07:51	4451	980	199	Wabash Ave & Grand Ave	35	Streeter Dr & Grand Ave	Customer
...	...	...	...	...	...	...	...	...	...	...
683827	12150165	10/1/2016 00:01:08	10/1/2016 00:04:42	3999	214	56	Desplaines St & Kinzie St	133	Kingsbury St & Kinzie St	Subscriber
683828	12150164	10/1/2016 00:00:58	10/1/2016 00:09:33	2483	515	255	Indiana Ave & Roosevelt Rd	4	Burnham Harbor	Subscriber
683829	12150163	10/1/2016 00:00:41	10/1/2016 00:04:19	3892	218	56	Desplaines St & Kinzie St	133	Kingsbury St & Kinzie St	Subscriber
683830	12150162	10/1/2016 00:00:32	10/1/2016 00:16:02	3567	930	298	Lincoln Ave & Belle Plaine Ave	460	Clark St & Bryn Mawr Ave	Subscriber
683831	12150161	10/1/2016 00:00:14	10/1/2016 00:16:02	5320	948	298	Lincoln Ave & Belle Plaine Ave	460	Clark St & Bryn Mawr Ave	Subscriber

683832 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2017_Q1.csv
File Name: Divvy_Trips_2017_Q1.csv
Content:
```

	trip_id	start_time	end_time	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	13518905	3/31/2017 23:59:07	4/1/2017 00:13:24	5292	857	66	Clinton St & Lake St	171	May St & Cullerton St	Subscriber
1	13518904	3/31/2017 23:56:25	4/1/2017 00:00:21	4408	236	199	Wabash Ave & Grand Ave	26	McClurg Ct & Illinois St	Subscriber
2	13518903	3/31/2017 23:55:33	4/1/2017 00:01:21	696	348	520	Greenview Ave & Jarvis Ave	432	Clark St & Lunt Ave	Subscriber
3	13518902	3/31/2017 23:54:46	3/31/2017 23:59:34	4915	288	110	Dearborn St & Erie St	142	McClurg Ct & Erie St	Subscriber
4	13518901	3/31/2017 23:53:33	4/1/2017 00:00:28	4247	415	327	Sheffield Ave & Webster Ave	331	Halsted St & Blackhawk St (*)	Subscriber
...	...	...	...	...	...	...	...	...	...	...
431686	12979234	1/1/2017 00:07:57	1/1/2017 00:20:53	2209	776	300	Broadway & Barry Ave	118	Sedgwick St & North Ave	Subscriber
431687	12979233	1/1/2017 00:07:28	1/1/2017 00:12:51	5637	323	287	Franklin St & Monroe St	68	Clinton St & Tilden St	Subscriber
431688	12979232	1/1/2017 00:06:06	1/1/2017 00:18:31	4992	745	620	Orleans St & Chestnut St (NEXT Apts)	333	Ashland Ave & Blackhawk St	Subscriber
431689	12979231	1/1/2017 00:02:54	1/1/2017 00:08:21	3660	327	28	Larrabee St & Menomonee St	20	Sheffield Ave & Kingsbury St	Subscriber
431690	12979230	1/1/2017 00:00:36	1/1/2017 00:06:32	2511	356	414	Canal St & Taylor St	191	Canal St & Monroe St (*)	Customer

431691 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2017_Q2.csv
File Name: Divvy_Trips_2017_Q2.csv
Content:
```

	trip_id	start_time	end_time	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	14853213	6/30/2017 23:59:51	7/1/2017 00:13:57	893	846	107	Desplaines St & Jackson Blvd	56	Desplaines St & Kinzie St	Subscriber
1	14853212	6/30/2017 23:59:28	7/1/2017 00:07:10	1909	462	165	Clark St & Grace St	234	Clark St & Montrose Ave	Subscriber
2	14853210	6/30/2017 23:59:18	7/1/2017 00:04:58	2071	340	327	Sheffield Ave & Webster Ave	327	Sheffield Ave & Webster Ave	Subscriber
3	14853209	6/30/2017 23:59:14	7/1/2017 00:06:21	101	427	192	Canal St & Adams St	40	LaSalle St & Adams St	Subscriber
4	14853208	6/30/2017 23:59:01	7/1/2017 00:08:41	50	580	130	Damen Ave & Division St	331	Halsted St & Blackhawk St (*)	Subscriber
...	...	...	...	...	...	...	...	...	...	...
1119809	13518910	4/1/2017 00:06:30	4/1/2017 00:11:56	1796	326	296	Broadway & Belmont Ave	232	Pine Grove Ave & Waveland Ave	Subscriber
1119810	13518909	4/1/2017 00:06:00	4/1/2017 00:20:53	22	893	199	Wabash Ave & Grand Ave	68	Clinton St & Tilden St	Subscriber
1119811	13518908	4/1/2017 00:04:13	4/1/2017 00:19:20	1296	907	56	Desplaines St & Kinzie St	69	Damen Ave & Pierce Ave	Subscriber
1119812	13518907	4/1/2017 00:03:08	4/1/2017 00:08:24	2695	316	332	Halsted St & Diversey Pkwy	226	Racine Ave & Belmont Ave	Subscriber
1119813	13518906	4/1/2017 00:01:35	4/1/2017 00:14:30	4596	775	52	Michigan Ave & Lake St	284	Michigan Ave & Jackson Blvd	Subscriber

1119814 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2017_Q3.csv
File Name: Divvy_Trips_2017_Q3.csv
Content:
```

	trip_id	start_time	end_time	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	16734065	9/30/2017 23:59:58	10/1/2017 00:05:47	1411	349	216	California Ave & Division St	259	California Ave & Francis Pl	Subscriber
1	16734064	9/30/2017 23:59:53	10/1/2017 00:05:47	3048	354	216	California Ave & Division St	259	California Ave & Francis Pl	Subscriber
2	16734063	9/30/2017 23:59:06	10/1/2017 00:02:52	2590	226	141	Clark St & Lincoln Ave	144	Larrabee St & Webster Ave	Subscriber
3	16734062	9/30/2017 23:58:56	10/1/2017 00:07:37	551	521	96	Desplaines St & Randolph St	217	Racine Ave (May St) & Fulton St	Customer
4	16734061	9/30/2017 23:58:47	10/1/2017 00:07:37	1287	530	96	Desplaines St & Randolph St	217	Racine Ave (May St) & Fulton St	Customer
...	...	...	...	...	...	...	...	...	...	...
1608265	14853218	7/1/2017 00:01:28	7/1/2017 00:20:18	5647	1130	299	Halsted St & Roscoe St	176	Clark St & Elm St	Subscriber
1608266	14853217	7/1/2017 00:01:23	7/1/2017 00:16:54	5802	931	240	Sheridan Rd & Irving Park Rd	347	Ashland Ave & Grace St	Subscriber
1608267	14853216	7/1/2017 00:01:05	7/1/2017 00:18:00	3466	1003	35	Streeter Dr & Grand Ave	47	State St & Kinzie St	Subscriber
1608268	14853215	7/1/2017 00:00:34	7/1/2017 00:20:15	4224	1181	28	Larrabee St & Menomonee St	25	Michigan Ave & Pearson St	Subscriber
1608269	14853214	7/1/2017 00:00:20	7/1/2017 00:11:57	1713	697	340	Clark St & Wrightwood Ave	334	Lake Shore Dr & Belmont Ave	Subscriber

1608270 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2017_Q4.csv
File Name: Divvy_Trips_2017_Q4.csv
Content:
```

	trip_id	start_time	end_time	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	17536701	12/31/2017 23:58	1/1/2018 0:03	3304	284	159	Claremont Ave & Hirsch St	69	Damen Ave & Pierce Ave	Subscriber
1	17536700	12/31/2017 23:54	1/1/2018 0:18	5975	1402	145	Mies van der Rohe Way & Chestnut St	145	Mies van der Rohe Way & Chestnut St	Customer
2	17536699	12/31/2017 23:54	1/1/2018 0:18	4906	1441	145	Mies van der Rohe Way & Chestnut St	145	Mies van der Rohe Way & Chestnut St	Customer
3	17536698	12/31/2017 23:48	12/31/2017 23:53	5667	315	340	Clark St & Wrightwood Ave	143	Sedgwick St & Webster Ave	Subscriber
4	17536697	12/31/2017 23:42	12/31/2017 23:47	5353	272	240	Sheridan Rd & Irving Park Rd	245	Clarendon Ave & Junior Ter	Subscriber
...	...	...	...	...	...	...	...	...	...	...
669234	16734070	10/1/2017 0:01	10/1/2017 0:15	1099	837	289	Wells St & Concord Ln	226	Racine Ave & Belmont Ave	Subscriber
669235	16734069	10/1/2017 0:00	10/1/2017 0:07	3688	366	45	Michigan Ave & Congress Pkwy	52	Michigan Ave & Lake St	Customer
669236	16734068	10/1/2017 0:00	10/1/2017 0:05	1416	264	520	Greenview Ave & Jarvis Ave	447	Glenwood Ave & Morse Ave	Customer
669237	16734067	10/1/2017 0:00	10/1/2017 0:06	5396	361	288	Larrabee St & Armitage Ave	289	Wells St & Concord Ln	Subscriber
669238	16734066	10/1/2017 0:00	10/1/2017 0:12	5802	741	135	Halsted St & 21st St	129	Blue Island Ave & 18th St	Subscriber

669239 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2018_Q1.csv
File Name: Divvy_Trips_2018_Q1.csv
Content:
```

	01 - Rental Details Rental ID	01 - Rental Details Local Start Time	01 - Rental Details Local End Time	01 - Rental Details Bike ID	01 - Rental Details Duration In Seconds Uncapped	03 - Rental Start Station ID	03 - Rental Start Station Name	02 - Rental End Station ID	02 - Rental End Station Name	User Type	Member Gender	05 - Member Details Member Birthday Year
0	17536702	2018-01-01 00:12:00	2018-01-01 00:17:23	3304	323.0	69	Damen Ave & Pierce Ave	159	Claremont Ave & Hirsch St	Subscriber	Male	1988.0
1	17536703	2018-01-01 00:41:35	2018-01-01 00:47:52	5367	377.0	253	Winthrop Ave & Lawrence Ave	325	Clark St & Winnemac Ave (Temp)	Subscriber	Male	1984.0
2	17536704	2018-01-01 00:44:46	2018-01-01 01:33:10	4599	2,904.0	98	LaSalle St & Washington St	509	Troy St & North Ave	Subscriber	Male	1989.0
3	17536705	2018-01-01 00:53:10	2018-01-01 01:05:37	2302	747.0	125	Rush St & Hubbard St	364	Larrabee St & Oak St	Subscriber	Male	1983.0
4	17536706	2018-01-01 00:53:37	2018-01-01 00:56:40	3696	183.0	129	Blue Island Ave & 18th St	205	Paulina St & 18th St	Subscriber	Male	1989.0
...	...	...	...	...	...	...	...	...	...	...	...	...
387140	18000521	2018-03-31 23:46:34	2018-04-01 00:05:24	1935	1,130.0	158	Milwaukee Ave & Wabansia Ave	260	Kedzie Ave & Milwaukee Ave	Subscriber	Male	1982.0
387141	18000523	2018-03-31 23:47:43	2018-03-31 23:52:05	5852	262.0	299	Halsted St & Roscoe St	229	Southport Ave & Roscoe St	Subscriber	Male	1989.0
387142	18000524	2018-03-31 23:50:18	2018-03-31 23:57:38	4414	440.0	327	Sheffield Ave & Webster Ave	226	Racine Ave & Belmont Ave	Subscriber	Male	1991.0
387143	18000525	2018-03-31 23:52:26	2018-04-01 00:07:13	6448	887.0	265	Cottage Grove Ave & Oakwood Blvd	426	Ellis Ave & 60th St	Subscriber	Male	1991.0
387144	18000526	2018-03-31 23:53:38	2018-04-01 00:03:08	2769	570.0	485	Sawyer Ave & Irving Park Rd	475	Washtenaw Ave & Lawrence Ave	Subscriber	Male	1991.0

387145 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2018_Q2.csv
File Name: Divvy_Trips_2018_Q2.csv
Content:
```

	trip_id	start_time	end_time	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	18000527	2018-04-01 00:04:44	2018-04-01 00:13:03	3819	499.0	22	May St & Taylor St	171	May St & Cullerton St	Subscriber
1	18000528	2018-04-01 00:06:42	2018-04-01 00:27:07	5000	1,225.0	157	Lake Shore Dr & Wellington Ave	190	Southport Ave & Wrightwood Ave	Subscriber
2	18000529	2018-04-01 00:07:19	2018-04-01 00:23:19	5165	960.0	106	State St & Pearson St	106	State St & Pearson St	Subscriber
3	18000530	2018-04-01 00:07:33	2018-04-01 00:14:47	3851	434.0	241	Morgan St & Polk St	171	May St & Cullerton St	Subscriber
4	18000531	2018-04-01 00:10:23	2018-04-01 00:22:12	5065	709.0	228	Damen Ave & Melrose Ave	219	Damen Ave & Cortland St	Subscriber
...	...	...	...	...	...	...	...	...	...	...
1059676	19244618	2018-06-30 23:59:27	2018-07-01 00:06:33	338	426.0	141	Clark St & Lincoln Ave	313	Lakeview Ave & Fullerton Pkwy	Subscriber
1059677	19244619	2018-06-30 23:59:48	2018-07-01 00:08:45	3646	537.0	260	Kedzie Ave & Milwaukee Ave	506	Spaulding Ave & Armitage Ave	Subscriber
1059678	19244620	2018-06-30 23:59:56	2018-07-01 00:17:14	4360	1,038.0	38	Clark St & Lake St	338	Calumet Ave & 18th St	Subscriber
1059679	19244621	2018-06-30 23:59:55	2018-07-01 00:38:10	401	2,295.0	284	Michigan Ave & Jackson Blvd	340	Clark St & Wrightwood Ave	Customer
1059680	19700907	2018-05-24 15:13:59	2018-05-24 15:18:22	2463	263.0	51	Clark St & Randolph St	77	Clinton St & Madison St	Subscriber

1059681 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2018_Q3.csv
File Name: Divvy_Trips_2018_Q3.csv
Content:
```

	trip_id	start_time	end_time	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	19244622	2018-07-01 00:00:03	2018-07-01 23:56:11	3429	86,168.0	140	Dearborn Pkwy & Delaware Pl	106	State St & Pearson St	Subscriber
1	19244623	2018-07-01 00:00:39	2018-07-01 00:06:39	93	386.0	153	Southport Ave & Wellington Ave	250	Ashland Ave & Wellington Ave	Subscriber
2	19244624	2018-07-01 00:00:15	2018-07-01 00:23:26	2461	1,391.0	76	Lake Shore Dr & Monroe St	301	Clark St & Schiller St	Subscriber
3	19244625	2018-07-01 00:00:25	2018-07-01 00:23:31	2991	1,386.0	76	Lake Shore Dr & Monroe St	301	Clark St & Schiller St	Subscriber
4	19244626	2018-07-01 00:00:27	2018-07-01 00:11:23	2851	656.0	60	Dayton St & North Ave	166	Ashland Ave & Wrightwood Ave	Subscriber
...	...	...	...	...	...	...	...	...	...	...
1513565	20983525	2018-09-30 23:50:58	2018-09-30 23:54:09	6468	191.0	162	Damen Ave & Wellington Ave	250	Ashland Ave & Wellington Ave	Subscriber
1513566	20983526	2018-09-30 23:53:22	2018-09-30 23:59:53	3731	391.0	426	Ellis Ave & 60th St	418	Ellis Ave & 53rd St	Customer
1513567	20983527	2018-09-30 23:54:17	2018-09-30 23:56:01	3096	104.0	107	Desplaines St & Jackson Blvd	73	Jefferson St & Monroe St	Subscriber
1513568	20983528	2018-09-30 23:55:36	2018-10-22 17:18:48	4338	1,876,990.0	43	Michigan Ave & Washington St	437	Washtenaw Ave & Ogden Ave (*)	Customer
1513569	20983529	2018-09-30 23:59:17	2018-10-01 00:10:54	2766	697.0	220	Clark St & Drummond Pl	166	Ashland Ave & Wrightwood Ave	Subscriber

1513570 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2018_Q4.csv
File Name: Divvy_Trips_2018_Q4.csv
Content:
```

	trip_id	start_time	end_time	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	20983530	2018-10-01 00:01:17	2018-10-01 00:29:35	4551	1,698.0	85	Michigan Ave & Oak St	166	Ashland Ave & Wrightwood Ave	Subscriber
1	20983531	2018-10-01 00:03:59	2018-10-01 00:10:55	847	416.0	13	Wilton Ave & Diversey Pkwy	144	Larrabee St & Webster Ave	Subscriber
2	20983532	2018-10-01 00:05:14	2018-10-01 00:14:08	6188	534.0	59	Wabash Ave & Roosevelt Rd	197	Michigan Ave & Madison St	Subscriber
3	20983533	2018-10-01 00:05:48	2018-10-01 00:18:46	6372	778.0	328	Ellis Ave & 58th St	419	Lake Park Ave & 53rd St	Subscriber
4	20983534	2018-10-01 00:07:29	2018-10-01 00:25:51	1927	1,102.0	93	Sheffield Ave & Willow St	159	Claremont Ave & Hirsch St	Subscriber
...	...	...	...	...	...	...	...	...	...	...
642681	21742438	2018-12-31 23:45:17	2018-12-31 23:50:05	2931	288.0	49	Dearborn St & Monroe St	164	Franklin St & Lake St	Subscriber
642682	21742439	2018-12-31 23:48:48	2018-12-31 23:57:22	4386	514.0	624	Dearborn St & Van Buren St (*)	44	State St & Randolph St	Subscriber
642683	21742440	2018-12-31 23:50:09	2018-12-31 23:57:16	4927	427.0	41	Federal St & Polk St	52	Michigan Ave & Lake St	Subscriber
642684	21742441	2018-12-31 23:55:04	2018-12-31 23:58:24	1350	200.0	141	Clark St & Lincoln Ave	118	Sedgwick St & North Ave	Subscriber
642685	21742442	2018-12-31 23:59:18	2019-01-01 00:20:43	2006	1,285.0	260	Kedzie Ave & Milwaukee Ave	166	Ashland Ave & Wrightwood Ave	Subscriber

642686 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2019_Q3.csv
File Name: Divvy_Trips_2019_Q3.csv
Content:
```

	trip_id	start_time	end_time	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	23479388	2019-07-01 00:00:27	2019-07-01 00:20:41	3591	1,214.0	117	Wilton Ave & Belmont Ave	497	Kimball Ave & Belmont Ave	Subscriber
1	23479389	2019-07-01 00:01:16	2019-07-01 00:18:44	5353	1,048.0	381	Western Ave & Monroe St	203	Western Ave & 21st St	Customer
2	23479390	2019-07-01 00:01:48	2019-07-01 00:27:42	6180	1,554.0	313	Lakeview Ave & Fullerton Pkwy	144	Larrabee St & Webster Ave	Customer
3	23479391	2019-07-01 00:02:07	2019-07-01 00:27:10	5540	1,503.0	313	Lakeview Ave & Fullerton Pkwy	144	Larrabee St & Webster Ave	Customer
4	23479392	2019-07-01 00:02:13	2019-07-01 00:22:26	6014	1,213.0	168	Michigan Ave & 14th St	62	McCormick Place	Customer
...	...	...	...	...	...	...	...	...	...	...
1640713	25223635	2019-09-30 23:56:27	2019-10-01 00:06:20	5690	593.0	84	Milwaukee Ave & Grand Ave	134	Peoria St & Jackson Blvd	Subscriber
1640714	25223636	2019-09-30 23:57:02	2019-10-01 00:02:13	5079	310.0	268	Lake Shore Dr & North Blvd	85	Michigan Ave & Oak St	Subscriber
1640715	25223637	2019-09-30 23:57:45	2019-10-01 00:01:41	5535	235.0	423	University Ave & 57th St	426	Ellis Ave & 60th St	Customer
1640716	25223638	2019-09-30 23:57:47	2019-10-01 00:04:41	6120	414.0	110	Dearborn St & Erie St	31	Franklin St & Chicago Ave (Temp)	Subscriber
1640717	25223639	2019-09-30 23:59:37	2019-10-01 00:05:17	60	339.0	265	Cottage Grove Ave & Oakwood Blvd	179	MLK Jr Dr & Pershing Rd	Subscriber

1640718 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2019_Q4.csv
File Name: Divvy_Trips_2019_Q4.csv
Content:
```

	trip_id	start_time	end_time	bikeid	tripduration	from_station_id	from_station_name	to_station_id	to_station_name	usertype
0	25223640	2019-10-01 00:01:39	2019-10-01 00:17:20	2215	940.0	20	Sheffield Ave & Kingsbury St	309	Leavitt St & Armitage Ave	Subscriber
1	25223641	2019-10-01 00:02:16	2019-10-01 00:06:34	6328	258.0	19	Throop (Loomis) St & Taylor St	241	Morgan St & Polk St	Subscriber
2	25223642	2019-10-01 00:04:32	2019-10-01 00:18:43	3003	850.0	84	Milwaukee Ave & Grand Ave	199	Wabash Ave & Grand Ave	Subscriber
3	25223643	2019-10-01 00:04:32	2019-10-01 00:43:43	3275	2,350.0	313	Lakeview Ave & Fullerton Pkwy	290	Kedzie Ave & Palmer Ct	Subscriber
4	25223644	2019-10-01 00:04:34	2019-10-01 00:35:42	5294	1,867.0	210	Ashland Ave & Division St	382	Western Ave & Congress Pkwy	Subscriber
...	...	...	...	...	...	...	...	...	...	...
704049	25962900	2019-12-31 23:56:13	2020-01-01 00:15:45	2196	1,172.0	112	Green St & Randolph St	225	Halsted St & Dickens Ave	Subscriber
704050	25962901	2019-12-31 23:56:34	2020-01-01 00:22:08	4877	1,533.0	90	Millennium Park	90	Millennium Park	Subscriber
704051	25962902	2019-12-31 23:57:05	2020-01-01 00:05:46	863	520.0	623	Michigan Ave & 8th St	52	Michigan Ave & Lake St	Subscriber
704052	25962903	2019-12-31 23:57:11	2020-01-01 00:05:45	2637	514.0	623	Michigan Ave & 8th St	52	Michigan Ave & Lake St	Subscriber
704053	25962904	2019-12-31 23:57:17	2019-12-31 23:59:18	5930	120.0	256	Broadway & Sheridan Rd	240	Sheridan Rd & Irving Park Rd	Subscriber

704054 rows × 12 columns

```
Location: C:\The Goods\Financial Analysis\Python\Google\Google Case Study\csv\Divvy_Trips_2020_Q1.csv
File Name: Divvy_Trips_2020_Q1.csv
Content:
```

	ride_id	rideable_type	started_at	ended_at	start_station_name	start_station_id	end_station_name	end_station_id	start_la
0	EACB19130B0CDA4A	docked_bike	2020-01-21 20:06:59	2020-01-21 20:14:30	Western Ave & Leland Ave	239	Clark St & Leland Ave	326.0	41.966
1	8FED874C809DC021	docked_bike	2020-01-30 14:22:39	2020-01-30 14:26:22	Clark St & Montrose Ave	234	Southport Ave & Irving Park Rd	318.0	41.961
2	789F3C21E472CA96	docked_bike	2020-01-09 19:29:26	2020-01-09 19:32:17	Broadway & Belmont Ave	296	Wilton Ave & Belmont Ave	117.0	41.940
3	C9A388DAC6ABF313	docked_bike	2020-01-06 16:17:07	2020-01-06 16:25:56	Clark St & Randolph St	51	Fairbanks Ct & Grand Ave	24.0	41.884
4	943BC3CBECCFD662	docked_bike	2020-01-30 08:37:16	2020-01-30 08:42:48	Clinton St & Lake St	66	Wells St & Hubbard St	212.0	41.885
...	...	...	...	...	...	...	...	...	...
426882	ADDAA33CEBCAE733	docked_bike	2020-03-10 10:40:06	2020-03-10 10:40:07	HQ QR	675	HQ QR	675.0	41.889
426883	82B10FA3994BC66A	docked_bike	2020-03-07 15:25:55	2020-03-07 16:14:03	Rush St & Superior St	161	Sheridan Rd & Irving Park Rd	240.0	41.895
426884	AA0D5AAA0B59C8AA	docked_bike	2020-03-01 13:12:38	2020-03-01 13:38:29	Clark St & Lincoln Ave	141	Ashland Ave & Division St	210.0	41.915
426885	3296360A7BC20FB8	docked_bike	2020-03-07 18:02:45	2020-03-07 18:13:18	Franklin St & Illinois St	672	Stetson Ave & South Water St	264.0	41.891
426886	064EC7698E4FF9B3	docked_bike	2020-03-08 13:03:57	2020-03-08 13:32:27	Dearborn St & Erie St	110	Michigan Ave & Oak St	85.0	41.894

426887 rows × 13 columns

In [5]:
```
# look at all the files in the directory
for file in glob.glob("*.csv"):
    print(file)
```

```
202004-divvy-tripdata.csv
202005-divvy-tripdata.csv
202006-divvy-tripdata.csv
202007-divvy-tripdata.csv
202008-divvy-tripdata.csv
202009-divvy-tripdata.csv
202010-divvy-tripdata.csv
202011-divvy-tripdata.csv
202012-divvy-tripdata.csv
202101-divvy-tripdata.csv
202103-divvy-tripdata.csv
Divvy_Stations_2013.csv
Divvy_Stations_2014-Q3Q4.csv
Divvy_Stations_2016_Q3.csv
Divvy_Stations_2016_Q4.csv
Divvy_Stations_2017_Q1Q2.csv
Divvy_Stations_2017_Q3Q4.csv
Divvy_Trips_2013.csv
Divvy_Trips_2014-Q3-07.csv
Divvy_Trips_2014-Q3-0809.csv
Divvy_Trips_2014-Q4.csv
Divvy_Trips_2014_Q1Q2.csv
Divvy_Trips_2015_07.csv
Divvy_Trips_2015_08.csv
Divvy_Trips_2015_09.csv
Divvy_Trips_2015_Q4.csv
Divvy_Trips_2016_Q3.csv
Divvy_Trips_2016_Q4.csv
Divvy_Trips_2017_Q1.csv
Divvy_Trips_2017_Q2.csv
Divvy_Trips_2017_Q3.csv
Divvy_Trips_2017_Q4.csv
Divvy_Trips_2018_Q1.csv
Divvy_Trips_2018_Q2.csv
Divvy_Trips_2018_Q3.csv
Divvy_Trips_2018_Q4.csv
Divvy_Trips_2019_Q3.csv
Divvy_Trips_2019_Q4.csv
Divvy_Trips_2020_Q1.csv
```

In [6]:
```
# Create a dataframe for each file. Definitely not the most efficient way, I know.
c202004 = pd.read_csv ("202004-divvy-tripdata.csv")
c202005 = pd.read_csv ("202005-divvy-tripdata.csv")
c202006 = pd.read_csv ("202006-divvy-tripdata.csv")
c202007 = pd.read_csv ("202007-divvy-tripdata.csv")
c202008 = pd.read_csv ("202008-divvy-tripdata.csv")
c202009 = pd.read_csv ("202009-divvy-tripdata.csv")
c202010 = pd.read_csv ("202010-divvy-tripdata.csv")
c202011 = pd.read_csv ("202011-divvy-tripdata.csv")
c202012 = pd.read_csv ("202012-divvy-tripdata.csv")
c202101 = pd.read_csv ("202101-divvy-tripdata.csv")
c202103 = pd.read_csv ("202103-divvy-tripdata.csv")
c2017Q1 = pd.read_csv ("Divvy_Trips_2017_Q1.csv")
c2017Q2 = pd.read_csv ("Divvy_Trips_2017_Q2.csv")
c2017Q3 = pd.read_csv ("Divvy_Trips_2017_Q3.csv")
c2017Q4 = pd.read_csv ("Divvy_Trips_2017_Q4.csv")
c2018Q1 = pd.read_csv ("Divvy_Trips_2018_Q1.csv")
c2018Q2 = pd.read_csv ("Divvy_Trips_2018_Q2.csv")
c2018Q3 = pd.read_csv ("Divvy_Trips_2018_Q3.csv")
c2018Q4 = pd.read_csv ("Divvy_Trips_2018_Q4.csv")
c2019Q3 = pd.read_csv ("Divvy_Trips_2019_Q3.csv")
c2019Q4 = pd.read_csv ("Divvy_Trips_2019_Q4.csv")
c2020Q1 = pd.read_csv ("Divvy_Trips_2020_Q1.csv")
```

In [7]:
```
# look at columns from trouble file
c2018Q1.columns
```

Out[7]:
```
Index(['01 - Rental Details Rental ID', '01 - Rental Details Local Start Time',
       '01 - Rental Details Local End Time', '01 - Rental Details Bike ID',
       '01 - Rental Details Duration In Seconds Uncapped',
       '03 - Rental Start Station ID', '03 - Rental Start Station Name',
       '02 - Rental End Station ID', '02 - Rental End Station Name',
       'User Type', 'Member Gender',
       '05 - Member Details Member Birthday Year'],
      dtype='object')
```

In [8]:
```
# look at columns from file named similarly as other files
c2018Q2.columns
```

Out[8]:
```
Index(['trip_id', 'start_time', 'end_time', 'bikeid', 'tripduration',
       'from_station_id', 'from_station_name', 'to_station_id',
       'to_station_name', 'usertype', 'gender', 'birthyear'],
      dtype='object')
```

In [9]:
```
# rename columns in trouble file
c2018Q1.columns = ['trip_id', 'start_time', 'end_time', 'bikeid', 'tripduration',
       'from_station_id', 'from_station_name', 'to_station_id',
       'to_station_name', 'usertype', 'gender', 'birthyear']
```

In [10]:
```
# join older datasets
pdList_2017_2019 = [c2017Q1, c2017Q2, c2017Q3, c2017Q4, c2018Q1, c2018Q2, c2018Q3, c2018Q4, c2019Q3, c2019Q4]
df2017_2019 = pd.concat(pdList_2017_2019)
```

In [11]:
```
# join newer datasets
pdList_2020_2021 = [c2020Q1, c202004, c202005, c202006, c202007, c202008, c202009, c202010, c202011, c202012, c
df2020_2021 = pd.concat(pdList_2020_2021)
```

In [12]:
```
df2017_2019.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 9776868 entries, 0 to 704053
Data columns (total 12 columns):
 #   Column             Dtype  
---  ------             -----  
 0   trip_id            int64  
 1   start_time         object 
 2   end_time           object 
 3   bikeid             int64  
 4   tripduration       object 
 5   from_station_id    int64  
 6   from_station_name  object 
 7   to_station_id      int64  
 8   to_station_name    object 
 9   usertype           object 
 10  gender             object 
 11  birthyear          float64
dtypes: float64(1), int64(4), object(7)
memory usage: 969.7+ MB
```

In [13]:
```
df2020_2021.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 3867013 entries, 0 to 228495
Data columns (total 13 columns):
 #   Column              Dtype  
---  ------              -----  
 0   ride_id             object 
 1   rideable_type       object 
 2   started_at          object 
 3   ended_at            object 
 4   start_station_name  object 
 5   start_station_id    object 
 6   end_station_name    object 
 7   end_station_id      object 
 8   start_lat           float64
 9   start_lng           float64
 10  end_lat             float64
 11  end_lng             float64
 12  member_casual       object 
dtypes: float64(4), object(9)
memory usage: 413.0+ MB
```

In [14]:
```
# drop unnecessary columns
df2017_2019.drop(columns=['trip_id', 'bikeid', 'tripduration', 'from_station_id', 'to_station_id', 'gender', 'b
```

In [15]:
```
# drop unnecessary columns
df2020_2021.drop(columns=['ride_id', 'start_station_id', 'end_station_id'], inplace=True)
```

In [16]:
```
df2017_2019.columns
```

Out[16]:
```
Index(['start_time', 'end_time', 'from_station_name', 'to_station_name',
       'usertype'],
      dtype='object')
```

In [17]:
```
# convert date columns to datetime
df2017_2019[['start_time', 'end_time']] = df2017_2019[['start_time', 'end_time']].astype('datetime64[ns]')
```

In [18]:
```
# convert date columns to datetime
df2020_2021[['started_at', 'ended_at']] = df2020_2021[['started_at', 'ended_at']].astype('datetime64[ns]')
```

In [19]:
```
df2017_2019.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 9776868 entries, 0 to 704053
Data columns (total 5 columns):
 #   Column             Dtype         
---  ------             -----         
 0   start_time         datetime64[ns]
 1   end_time           datetime64[ns]
 2   from_station_name  object        
 3   to_station_name    object        
 4   usertype           object        
dtypes: datetime64[ns](2), object(3)
memory usage: 447.5+ MB
```

In [20]:
```
# rename columns
df2017_2019.rename(columns={'start_time' : 'started_at',
                            'end_time' : 'ended_at',
                            'from_station_name' : 'start_station_name',
                           'to_station_name' : 'end_station_name',
                           'usertype' : 'member_casual'}, inplace=True)
```

In [21]:
```
df2017_2019.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 9776868 entries, 0 to 704053
Data columns (total 5 columns):
 #   Column              Dtype         
---  ------              -----         
 0   started_at          datetime64[ns]
 1   ended_at            datetime64[ns]
 2   start_station_name  object        
 3   end_station_name    object        
 4   member_casual       object        
dtypes: datetime64[ns](2), object(3)
memory usage: 447.5+ MB
```

In [22]:
```
# find the mean coordinates for each station and assign to missing values
df2020_2021_grouped_start = df2020_2021.groupby('start_station_name')['start_lat', 'start_lng'].agg('mean').res
```

```
<ipython-input-22-5178b1b6f7a1>:2: FutureWarning: Indexing with multiple keys (implicitly converted to a tuple
of keys) will be deprecated, use a list instead.
  df2020_2021_grouped_start = df2020_2021.groupby('start_station_name')['start_lat', 'start_lng'].agg('mean').r
eset_index()
```

In [23]:
```
# find the mean coordinates for each station and assign to missing values
df2020_2021_grouped_end = df2020_2021.groupby('end_station_name')['end_lat', 'end_lng'].agg('mean').reset_index
```

```
<ipython-input-23-5a0c843ff335>:2: FutureWarning: Indexing with multiple keys (implicitly converted to a tuple
of keys) will be deprecated, use a list instead.
  df2020_2021_grouped_end = df2020_2021.groupby('end_station_name')['end_lat', 'end_lng'].agg('mean').reset_ind
ex()
```

In [24]:
```
df2020_2021_grouped_start.head()
```

Out[24]:

	start_station_name	start_lat	start_lng
0	2112 W Peterson Ave	41.991181	-87.683595
1	63rd St Beach	41.781023	-87.576114
2	900 W Harrison St	41.874768	-87.649805
3	Aberdeen St & Jackson Blvd	41.877722	-87.654796
4	Aberdeen St & Monroe St	41.880413	-87.655530

In [25]:
```
# assign missing station names
df2017_2019_merged = pd.merge(df2017_2019, df2020_2021_grouped_start, how='left', on=['start_station_name'])
```

In [26]:
```
# assign missing station names
df2017_2019_merged2 = pd.merge(df2017_2019_merged, df2020_2021_grouped_end, how='left', on=['end_station_name'])
```

In [27]:
```
df2017_2019_merged2.head()
```

Out[27]:

	started_at	ended_at	start_station_name	end_station_name	member_casual	start_lat	start_lng	end_lat	end_lng
0	2017-03-31 23:59:07	2017-04-01 00:13:24	Clinton St & Lake St	May St & Cullerton St	Subscriber	41.885603	-87.641824	41.855144	-87.654120
1	2017-03-31 23:56:25	2017-04-01 00:00:21	Wabash Ave & Grand Ave	McClurg Ct & Illinois St	Subscriber	41.891457	-87.626767	41.890397	-87.617549
2	2017-03-31 23:55:33	2017-04-01 00:01:21	Greenview Ave & Jarvis Ave	Clark St & Lunt Ave	Subscriber	42.015974	-87.668586	42.009076	-87.674207
3	2017-03-31 23:54:46	2017-03-31 23:59:34	Dearborn St & Erie St	McClurg Ct & Erie St	Subscriber	41.894017	-87.629310	41.894484	-87.617945
4	2017-03-31 23:53:33	2017-04-01 00:00:28	Sheffield Ave & Webster Ave	Halsted St & Blackhawk St (*)	Subscriber	41.921557	-87.653814	NaN	NaN

In [28]:
```
# merge old dataframes and new dataframes
years = [df2017_2019_merged2, df2020_2021]
df2017_2021 = pd.concat(years)
```

In [29]:
```
df2017_2021.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 13643881 entries, 0 to 228495
Data columns (total 10 columns):
 #   Column              Dtype
---  ------              -----
 0   started_at          datetime64[ns]
 1   ended_at            datetime64[ns]
 2   start_station_name  object
 3   end_station_name    object
 4   member_casual       object
 5   start_lat           float64
 6   start_lng           float64
 7   end_lat             float64
 8   end_lng             float64
 9   rideable_type       object
dtypes: datetime64[ns](2), float64(4), object(4)
memory usage: 1.1+ GB
```

In [30]:
```
# check out the values for the member_casual column
df2017_2021['member_casual'].value_counts()
```

Out[30]:
```
Subscriber    7664945
member        2398288
Customer      2111916
casual        1468725
Dependent           7
Name: member_casual, dtype: int64
```

In [31]:
```
# set-up member = subscriber & customer = casual
df2017_2021['member_casual'] = df2017_2021['member_casual'].replace(['Subscriber', 'Customer'],['member', 'casu
```

In [32]:
```
# get rid of Dependent value in column
df2017_2021.drop(df2017_2021[df2017_2021['member_casual'] == 'Dependent'].index, inplace = True)
```

In [33]:
```
df2017_2021['member_casual'].value_counts()
```

Out[33]:
```
member    10063212
casual     3580632
Name: member_casual, dtype: int64
```

In [34]:
```
# find duration of trip
df2017_2021['trip_duration'] = df2017_2021['ended_at'] - df2017_2021['started_at']
```

In [35]:
```
# convert time column to minutes
df2017_2021['trip_duration_min'] = df2017_2021['trip_duration'].apply(lambda x: round(x.total_seconds()/60,1))
```

In [36]:
```
df2017_2021.head()
```

Out[36]:

	started_at	ended_at	start_station_name	end_station_name	member_casual	start_lat	start_lng	end_lat	end_lng	rideable_type	trip
0	2017-03-31 23:59:07	2017-04-01 00:13:24	Clinton St & Lake St	May St & Cullerton St	member	41.885603	-87.641824	41.855144	-87.654120	NaN	
1	2017-03-31 23:56:25	2017-04-01 00:00:21	Wabash Ave & Grand Ave	McClurg Ct & Illinois St	member	41.891457	-87.626767	41.890397	-87.617549	NaN	
2	2017-03-31 23:55:33	2017-04-01 00:01:21	Greenview Ave & Jarvis Ave	Clark St & Lunt Ave	member	42.015974	-87.668586	42.009076	-87.674207	NaN	
3	2017-03-31 23:54:46	2017-03-31 23:59:34	Dearborn St & Erie St	McClurg Ct & Erie St	member	41.894017	-87.629310	41.894484	-87.617945	NaN	
4	2017-03-31 23:53:33	2017-04-01 00:00:28	Sheffield Ave & Webster Ave	Halsted St & Blackhawk St (*)	member	41.921557	-87.653814	NaN	NaN	NaN	

In [37]:
```
df2017_2021['year'] = df2017_2021.ended_at.dt.year
df2017_2021['month'] = df2017_2021.ended_at.dt.month
df2017_2021['day'] = df2017_2021.ended_at.dt.dayofweek
df2017_2021['day_of_week'] = df2017_2021.ended_at.dt.day_name()
df2017_2021['hour'] = df2017_2021.ended_at.dt.hour
```

In [38]:
```
df2017_2021.head()
```

Out[38]:

	started_at	ended_at	start_station_name	end_station_name	member_casual	start_lat	start_lng	end_lat	end_lng	rideable_type	trip
0	2017-03-31 23:59:07	2017-04-01 00:13:24	Clinton St & Lake St	May St & Cullerton St	member	41.885603	-87.641824	41.855144	-87.654120	NaN	
1	2017-03-31 23:56:25	2017-04-01 00:00:21	Wabash Ave & Grand Ave	McClurg Ct & Illinois St	member	41.891457	-87.626767	41.890397	-87.617549	NaN	
2	2017-03-31 23:55:33	2017-04-01 00:01:21	Greenview Ave & Jarvis Ave	Clark St & Lunt Ave	member	42.015974	-87.668586	42.009076	-87.674207	NaN	
3	2017-03-31 23:54:46	2017-03-31 23:59:34	Dearborn St & Erie St	McClurg Ct & Erie St	member	41.894017	-87.629310	41.894484	-87.617945	NaN	
4	2017-03-31 23:53:33	2017-04-01 00:00:28	Sheffield Ave & Webster Ave	Halsted St & Blackhawk St (*)	member	41.921557	-87.653814	NaN	NaN	NaN	

In [39]:
```
# create summary statistics
agg_func_math = {
    'trip_duration_min':
    ['sum', 'count', 'mean', 'median', 'min', 'max', 'std']
}
df2017_2021.groupby(['member_casual', 'year']).agg(agg_func_math).round()
```

Out[39]:

		trip_duration_min						
		sum	count	mean	median	min	max	std
member_casual	year							
casual	2017	25888105.0	836870	31.0	23.0	-48.0	1439.0	44.0
	2018	42281746.0	677155	62.0	28.0	-45.0	239001.0	1189.0
	2019	35912313.0	597873	60.0	25.0	-48.0	132324.0	1034.0
	2020	62758195.0	1366575	46.0	22.0	-28996.0	156450.0	572.0
	2021	3698483.0	102159	36.0	17.0	0.0	31682.0	245.0
member	2017	35097211.0	2992134	12.0	10.0	-52.0	1435.0	16.0
	2018	42275529.0	2925920	14.0	10.0	-49.0	226020.0	317.0
	2019	25590762.0	1746880	15.0	10.0	-56.0	165959.0	310.0
	2020	25568460.0	2175092	12.0	10.0	-29050.0	93794.0	360.0
	2021	3031603.0	223186	14.0	10.0	-2.0	1560.0	27.0

In [40]:
```
# find upper and lower quantiles to help filter dataset
print(df2017_2021['trip_duration_min'].quantile(0.05))
print(df2017_2021['trip_duration_min'].quantile(0.95))
```

```
3.2
53.6
```

In [41]:
```
# convert all values > upper quantile and < lower quantile to respective value
df2017_2021['trip_duration_min'] = np.where(df2017_2021['trip_duration_min'] < 3.2, 3.2, df2017_2021['trip_dura
df2017_2021['trip_duration_min'] = np.where(df2017_2021['trip_duration_min'] > 53.6, 53.6, df2017_2021['trip_du
```

In [42]:
```
df2017_2021.groupby(['member_casual', 'year']).agg(agg_func_math).round()
```

Out[42]:

		trip_duration_min						
		sum	count	mean	median	min	max	std
member_casual	year							
casual	2017	21460258.9	836870	25.6	22.9	3.2	53.6	13.9
	2018	20991877.3	677155	31.0	27.9	3.2	53.6	16.5
	2019	17121901.7	597873	28.6	25.2	3.2	53.6	16.3
	2020	35723340.0	1366575	26.1	21.5	3.2	53.6	17.1
	2021	2326336.3	102159	22.8	17.3	3.2	53.6	16.5
member	2017	34343085.4	2992134	11.5	9.6	3.2	53.6	7.5
	2018	35568762.1	2925920	12.2	9.6	3.2	53.6	8.8
	2019	22145696.9	1746880	12.7	10.0	3.2	53.6	9.1
	2020	31429989.1	2175092	14.4	11.1	3.2	53.6	10.9
	2021	2866604.8	223186	12.8	9.5	3.2	53.6	10.2

In [43]:
```
# check out number of null values
df2017_2021.isnull().sum().sort_values(ascending=False)
```

Out[43]:
```
rideable_type         9776861
end_lng                374152
end_lat                374152
start_lat              371757
start_lng              371757
end_station_name       137885
start_station_name     118129
ended_at                    0
member_casual               0
hour                        0
day_of_week                 0
trip_duration               0
trip_duration_min           0
year                        0
month                       0
day                         0
started_at                  0
dtype: int64
```

In [44]:
```
# seems to be a huge problem in the recent data
df2017_2019.isnull().sum().sort_values(ascending=False)
```

Out[44]:
```
member_casual         0
end_station_name      0
start_station_name    0
ended_at              0
started_at            0
dtype: int64
```

In [45]:
```
df2020_2021.isnull().sum().sort_values(ascending=False)
```

Out[45]:
```
end_station_name      137885
start_station_name    118129
end_lng                 4525
end_lat                 4525
member_casual              0
start_lng                  0
start_lat                  0
ended_at                   0
started_at                 0
rideable_type              0
dtype: int64
```

In [46]:
```
c202004.isnull().sum().sort_values(ascending=False)
```

Out[46]:
```
end_lng               99
end_lat               99
end_station_id        99
end_station_name      99
member_casual          0
start_lng              0
start_lat              0
start_station_id       0
start_station_name     0
ended_at               0
started_at             0
rideable_type          0
ride_id                0
dtype: int64
```

In [47]:
```
c202005.isnull().sum().sort_values(ascending=False)
```

Out[47]:
```
end_lng               321
end_lat               321
end_station_id        321
end_station_name      321
member_casual           0
start_lng               0
start_lat               0
start_station_id        0
start_station_name      0
ended_at                0
started_at              0
rideable_type           0
ride_id                 0
dtype: int64
```

In [48]:
```
c202006.isnull().sum().sort_values(ascending=False)
```

Out[48]:
```
end_lng               468
end_lat               468
end_station_id        468
end_station_name      468
member_casual           0
start_lng               0
start_lat               0
start_station_id        0
start_station_name      0
ended_at                0
started_at              0
rideable_type           0
ride_id                 0
dtype: int64
```

In [49]:
```
c202007.isnull().sum().sort_values(ascending=False)
```

Out[49]:
```
end_station_id        969
end_station_name      967
end_lng               770
end_lat               770
start_station_id      152
start_station_name    149
member_casual           0
start_lng               0
start_lat               0
ended_at                0
started_at              0
rideable_type           0
ride_id                 0
dtype: int64
```

In [50]:
```
c202008.isnull().sum().sort_values(ascending=False)
```

Out[50]:
```
end_station_id        10110
end_station_name      10035
start_station_id       7691
start_station_name     7595
end_lng                 938
end_lat                 938
member_casual             0
start_lng                 0
start_lat                 0
ended_at                  0
started_at                0
rideable_type             0
ride_id                   0
dtype: int64
```

In [51]:
```
c202009.isnull().sum().sort_values(ascending=False)
```

Out[51]:
```
end_station_id        23524
end_station_name      23373
start_station_id      19901
start_station_name    19691
end_lng                 789
end_lat                 789
member_casual             0
start_lng                 0
start_lat                 0
ended_at                  0
started_at                0
rideable_type             0
ride_id                   0
dtype: int64
```

In [52]:
```
c202010.isnull().sum().sort_values(ascending=False)
```

Out[52]:
```
end_station_id        35787
end_station_name      35631
start_station_id      31405
start_station_name    31198
end_lng                 474
end_lat                 474
member_casual             0
start_lng                 0
start_lat                 0
ended_at                  0
started_at                0
rideable_type             0
ride_id                   0
dtype: int64
```

In [53]:
```
c202011.isnull().sum().sort_values(ascending=False)
```

Out[53]:
```
end_station_id        26826
end_station_name      26749
start_station_id      24434
start_station_name    24324
end_lng                 284
end_lat                 284
member_casual             0
start_lng                 0
start_lat                 0
ended_at                  0
started_at                0
rideable_type             0
ride_id                   0
dtype: int64
```

In [54]:
```
c202012.isnull().sum().sort_values(ascending=False)
```

Out[54]:
```
end_station_id        13237
end_station_name      13237
start_station_id      11699
start_station_name    11699
end_lng                 111
end_lat                 111
member_casual             0
start_lng                 0
start_lat                 0
ended_at                  0
started_at                0
rideable_type             0
ride_id                   0
dtype: int64
```

In [55]:
```
c202101.isnull().sum().sort_values(ascending=False)
```

Out[55]:
```
end_station_id        10277
end_station_name      10277
start_station_id       8625
start_station_name     8625
end_lng                 103
end_lat                 103
member_casual             0
start_lng                 0
start_lat                 0
ended_at                  0
started_at                0
rideable_type             0
ride_id                   0
dtype: int64
```

In [56]:
```
c202103.isnull().sum().sort_values(ascending=False)
```

Out[56]:
```
end_station_id        16727
end_station_name      16727
start_station_id      14848
start_station_name    14848
end_lng                 167
end_lat                 167
member_casual             0
start_lng                 0
start_lat                 0
ended_at                  0
started_at                0
rideable_type             0
ride_id                   0
dtype: int64
```

In [57]:
```
# get rid of null values
df2017_2021.dropna(subset=['start_station_name', 'start_lat'], thresh=2, inplace=True)
```

In [58]:
```
# get rid of null values
df2017_2021.dropna(subset=['end_station_name', 'end_lat'], thresh=2, inplace=True)
```

In [59]:
```
df2017_2021.isnull().sum().sort_values(ascending=False)
```

Out[59]:
```
rideable_type         9066014
hour                        0
end_lat                     0
ended_at                    0
start_station_name          0
end_station_name            0
member_casual               0
start_lat                   0
start_lng                   0
end_lng                     0
day_of_week                 0
trip_duration               0
trip_duration_min           0
year                        0
month                       0
day                         0
started_at                  0
dtype: int64
```

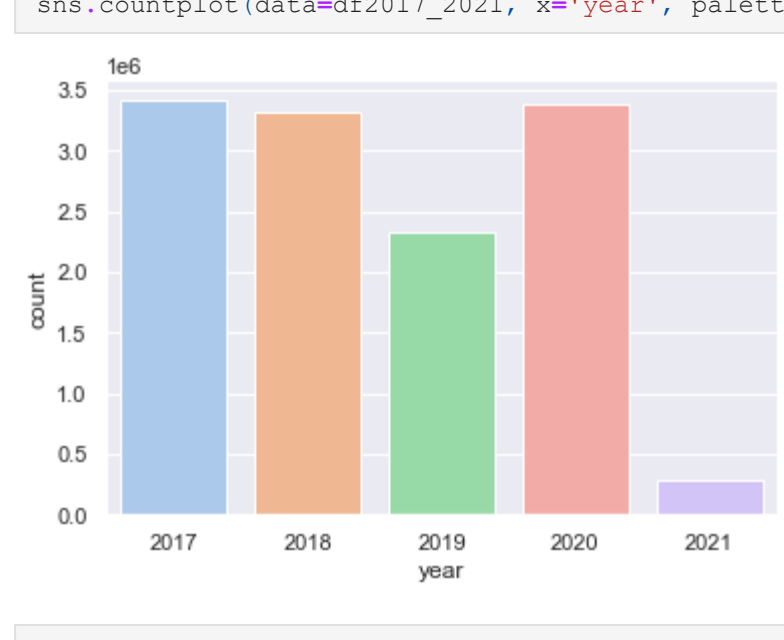
In [60]:
```
ride_counts = df2017_2021.year.count()
print('The total numbers of rides: ' f"{ride_counts:,}")
```

```
The total numbers of rides: 12,745,437
```

In [61]:
```
print(df2017_2021.year.value_counts().sort_index(ascending=True))
```

```
2017    3415737
2018    3320926
2019    2329322
2020    3390237
2021     289215
Name: year, dtype: int64
```

In [62]:
```
sns.countplot(data=df2017_2021, x='year', palette='pastel');
```



In [63]:
```
# isolate recent data for analysis
df_recent = df2017_2021[df2017_2021.year.isin(['2020','2021'])]
df_recent.head()
```

Out[63]:

	started_at	ended_at	start_station_name	end_station_name	member_casual	start_lat	start_lng	end_lat	end_lng	rideable_typ
9148001	2019-10-06 13:57:02	2020-01-13 21:55:24	Kedzie Ave & Roosevelt Rd	HUBBARD ST BIKE CHECKING (LBS-WH-TEST)	casual	41.866500	-87.706495	41.889962	-87.680598	Na
9325981	2019-10-19 15:14:50	2020-01-21 13:54:35	Cicero Ave & Lake St	HUBBARD ST BIKE CHECKING (LBS-WH-TEST)	casual	41.886840	-87.745290	41.889962	-87.680598	Na
9633427	2019-12-03 11:12:34	2020-01-10 01:06:36	Federal St & Polk St	Prairie Ave & Garfield Blvd	casual	41.872086	-87.629545	41.794869	-87.618704	Na
9703450	2019-12-14 12:21:03	2020-01-06 13:46:17	Austin Blvd & Lake St	HUBBARD ST BIKE CHECKING (LBS-WH-TEST)	casual	41.887915	-87.774440	41.889962	-87.680598	Na
9767069	2019-12-28 18:37:26	2020-01-06 12:57:27	Wabash Ave & 9th St	Clark St & Elm St	casual	41.870759	-87.625729	41.902965	-87.631301	Na

In [64]:
```
weekday_labels = ['Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday', 'Saturday', 'Sunday']
month_labels = ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']
```

In [65]:
```
average_ride_length = pd.pivot_table(df_recent, index=['member_casual'], values=['trip_duration_min'], aggfunc=
average_ride_length
```

Out[65]:

	mean
	trip_duration_min
member_casual	
casual	26.213117
member	14.314276

In [66]:
```
average_ride_length_by_day_of_week = pd.pivot_table(df_recent, index=['member_casual'], values=['trip_duration_
average_ride_length_by_day_of_week
```

Out[66]:

	mean						
	trip_duration_min						
day_of_week	Friday	Monday	Saturday	Sunday	Thursday	Tuesday	Wednesday
member_casual							
casual	24.793003	25.890054	27.761873	28.892497	24.142079	24.563254	24.126928
member	13.940846	13.584162	16.013128	16.201881	13.648666	13.507861	13.599530

In [67]:
```
df_recent['day_of_week'].value_counts()
```

Out[67]:
```
Saturday     654144
Sunday       550947
Friday       538004
Wednesday    501578
Thursday     500700
Tuesday      475104
Monday       458975
Name: day_of_week, dtype: int64
```

In [68]:
```
pop_start_station = df_recent['start_station_name'].value_counts()
pop_start_station.nlargest(20)
```

Out[68]:
```
Streeter Dr & Grand Ave        37340
Clark St & Elm St              34434
Lake Shore Dr & Monroe St      31706
Theater on the Lake            31082
Lake Shore Dr & North Blvd     27977
Wells St & Concord Ln          27043
Indiana Ave & Roosevelt Rd     26344
Dearborn St & Erie St          26318
Millennium Park                26009
Columbus Dr & Randolph St      25690
Broadway & Barry Ave           25603
Clark St & Armitage Ave        25202
Wells St & Huron St            24924
Wells St & Elm St              24501
Kingsbury St & Kinzie St       24395
Wabash Ave & Grand Ave         23863
St. Clair St & Erie St         23638
Clark St & Lincoln Ave         23350
Michigan Ave & Oak St          23197
Desplaines St & Kinzie St      23074
Name: start_station_name, dtype: int64
```

In [69]:
```
pop_end_station = df_recent['end_station_name'].value_counts()
pop_end_station.nlargest(20)
```

Out[69]:
```
Streeter Dr & Grand Ave           39879
Clark St & Elm St                 34584
Theater on the Lake               32669
Lake Shore Dr & Monroe St         30927
Lake Shore Dr & North Blvd        28553
Millennium Park                   27708
Wells St & Concord Ln             27594
Dearborn St & Erie St             27058
St. Clair St & Erie St            26410
Broadway & Barry Ave              26334
Indiana Ave & Roosevelt Rd        25809
Wabash Ave & Roosevelt Rd         24918
Wabash Ave & Grand Ave            24775
Michigan Ave & Oak St             24071
Kingsbury St & Kinzie St          23809
Clark St & Armitage Ave           23678
Wells St & Huron St               23426
Clark St & Lincoln Ave            23323
Wells St & Elm St                 23118
Lake Shore Dr & Wellington Ave    22756
Name: end_station_name, dtype: int64
```

In [70]:
```
def millions_format(x, pos):
    """
    Args are the value and tick position.
    Returns number of millions with one decimal, and M in lieu of 6 zeros.
    """
    return '{:.1f}{}'.format(x * 1e-6, 'M')
```

In [71]:
```
# Create plots comparing demand per different time categories:
fig = plt.figure(figsize = (15,16))
formatter = FuncFormatter(millions_format)

plt.subplot(3,1,1)
ax1 = sns.countplot(x=df_recent.hour, order = range(24))
ax1.yaxis.set_major_formatter(formatter)
plt.tick_params(labelsize=13)
plt.title('Total Number of Trips Between 12/1/20 and 3/31/21', fontsize=17, color='navy')
plt.xlabel('Hour', fontsize=13)

plt.subplot(3,1,2)
ax2 = sns.countplot(x=df_recent.day_of_week, order=weekday_labels)
ax2.yaxis.set_major_formatter(formatter)
plt.tick_params(labelsize=13)
plt.xlabel('')

plt.subplot(3,1,3)
ax3 = sns.countplot(x=df_recent.month)
ax3.set_xticklabels(month_labels)
ax3.yaxis.set_major_formatter(formatter)
plt.tick_params(labelsize=13)
plt.xlabel('')

plt.show()
```