```
# Installing packages
install.packages('tidyverse')
install.packages('lubridate')
install.packages('ggplot2')

# Setting the environment
library(tidyverse)
library(lubridate)
library(ggplot2)

# Preparing the working directory
setwd("/Users/goktugyaman/Documents/Data_Analysis_Case_Study/CSV")

# Data collection: importing csv files into RStuido
all_2013 <- read_csv("2013.csv")
q3_2014_07 <- read_csv("2014_07.csv")
q3_2014_08_09 <- read_csv("2014_08_09.csv")
q1_q2_2014 <- read_csv("2014_Q1_Q2.csv")
q4_2014 <- read_csv("2014_Q4.csv")
q3_2015_07 <- read_csv("2015_07.csv")
q3_2015_08 <- read_csv("2015_08.csv")
q3_2015_09 <- read_csv("2015_09.csv")
q1_2015 <- read_csv("2015_Q1.csv")
q2_2015 <- read_csv("2015_Q2.csv")
q4_2015 <- read_csv("2015_Q4.csv")
q2_2016_04 <- read_csv("2016_04.csv")
q2_2016_05 <- read_csv("2016_05.csv")
q2_2016_06 <- read_csv("2016_06.csv")
q1_2016 <- read_csv("2016_Q1.csv")
q3_2016 <- read_csv("2016_Q3.csv")
q4_2016 <- read_csv("2016_Q4.csv")
q1_2017 <- read_csv("2017_Q1.csv")
q2_2017 <- read_csv("2017_Q2.csv")
q3_2017 <- read_csv("2017_Q3.csv")
q4_2017 <- read_csv("2017_Q4.csv")
q1_2018 <- read_csv("2018_Q1.csv")
q2_2018 <- read_csv("2018_Q2.csv")
q3_2018 <- read_csv("2018_Q3.csv")
q4_2018 <- read_csv("2018_Q4.csv")
q1_2019 <- read_csv("2019_Q1.csv")
q2_2019 <- read_csv("2019_Q2.csv")
q3_2019 <- read_csv("2019_Q3.csv")
q4_2019 <- read_csv("2019_Q4.csv")
q1_2020 <- read_csv("2020_Q1.csv")
```

```
q2_2020_04 <- read_csv("2020_04.csv")
q2_2020_05 <- read_csv("2020_05.csv")
q2_2020_06 <- read_csv("2020_06.csv")
q3_2020_07 <- read_csv("2020_07.csv")
q3_2020_08 <- read_csv("2020_08.csv")
q3_2020_09 <- read_csv("2020_09.csv")
q4_2020_10 <- read_csv("2020_10.csv")
q4_2020_11 <- read_csv("2020_11.csv")
q4_2020_12 <- read_csv("2020_12.csv")
q1_2021_01 <- read_csv("2021_01.csv")
q1_2021_02 <- read_csv("2021_02.csv")
q1_2021_03 <- read_csv("2021_03.csv")
q2_2021_04 <- read_csv("2021_04.csv")
q2_2021_05 <- read_csv("2021_05.csv")
q2_2021_06 <- read_csv("2021_06.csv")
q3_2021_07 <- read_csv("2021_07.csv")
q3_2021_08 <- read_csv("2021_08.csv")
q3_2021_09 <- read_csv("2021_09.csv")
q4_2021_10 <- read_csv("2021_10.csv")
q4_2021_11 <- read_csv("2021_11.csv")
q4_2021_12 <- read_csv("2021_12.csv")

# Standardizing tables in order to join them into single dataframe
all_2013 <- rename(all_2013,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = starttime,
            ended_at = stoptime,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q1_q2_2014 <- rename(q1_q2_2014,
              ride_id = trip_id,
              rideable_type = bikeid,
              started_at = starttime,
              ended_at = stoptime,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
              end_station_name = to_station_name,
              member_casual = usertype)
q3_2014_07 <- rename(q3_2014_07,
```

```
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = starttime,
            ended_at = stoptime,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q3_2014_08_09 <- rename(q3_2014_08_09,
              ride_id = trip_id,
              rideable_type = bikeid,
              started_at = starttime,
              ended_at = stoptime,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
              end_station_name = to_station_name,
              member_casual = usertype)
q4_2014 <- rename(q4_2014,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = starttime,
            ended_at = stoptime,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q1_2015 <- rename(q1_2015,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = starttime,
            ended_at = stoptime,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q2_2015 <- rename(q2_2015,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = starttime,
            ended_at = stoptime,
```

```
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q3_2015_07 <- rename(q3_2015_07,
              ride_id = trip_id,
              rideable_type = bikeid,
              started_at = starttime,
              ended_at = stoptime,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
              end_station_name = to_station_name,
              member_casual = usertype)
q3_2015_08 <- rename(q3_2015_08,
              ride_id = trip_id,
              rideable_type = bikeid,
              started_at = starttime,
              ended_at = stoptime,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
              end_station_name = to_station_name,
              member_casual = usertype)
q3_2015_09 <- rename(q3_2015_09,
              ride_id = trip_id,
              rideable_type = bikeid,
              started_at = starttime,
              ended_at = stoptime,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
              end_station_name = to_station_name,
              member_casual = usertype)
q4_2015 <- rename(q4_2015,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = starttime,
            ended_at = stoptime,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
```

```
            member_casual = usertype)
q1_2016 <- rename(q1_2016,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = starttime,
            ended_at = stoptime,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q2_2016_04 <- rename(q2_2016_04,
              ride_id = trip_id,
              rideable_type = bikeid,
              started_at = starttime,
              ended_at = stoptime,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
              end_station_name = to_station_name,
              member_casual = usertype)
q2_2016_05 <- rename(q2_2016_05,
              ride_id = trip_id,
              rideable_type = bikeid,
              started_at = starttime,
              ended_at = stoptime,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
              end_station_name = to_station_name,
              member_casual = usertype)
q2_2016_06 <- rename(q2_2016_06,
              ride_id = trip_id,
              rideable_type = bikeid,
              started_at = starttime,
              ended_at = stoptime,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
              end_station_name = to_station_name,
              member_casual = usertype)
q3_2016 <- rename(q3_2016,
            ride_id = trip_id,
            rideable_type = bikeid,
```

```
            started_at = starttime,
            ended_at = stoptime,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q4_2016 <- rename(q4_2016,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = starttime,
            ended_at = stoptime,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q1_2017 <- rename(q1_2017,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = start_time,
            ended_at = end_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q2_2017 <- rename(q2_2017,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = start_time,
            ended_at = end_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q3_2017 <- rename(q3_2017,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = start_time,
            ended_at = end_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
```

```
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q4_2017 <- rename(q4_2017,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = start_time,
            ended_at = end_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q1_2018 <- rename(q1_2018,
            ride_id = "01 - Rental Details Rental ID",
            rideable_type = "01 - Rental Details Bike ID",
            started_at = "01 - Rental Details Local Start Time",
            ended_at = "01 - Rental Details Local End Time",
            start_station_name = "03 - Rental Start Station Name",
            start_station_id = "03 - Rental Start Station ID",
            end_station_name = "02 - Rental End Station Name",
            end_station_id = "02 - Rental End Station ID",
            member_casual = "User Type")
q2_2018 <- rename(q2_2018,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = start_time,
            ended_at = end_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q3_2018 <- rename(q3_2018,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = start_time,
            ended_at = end_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q4_2018 <- rename(q4_2018,
```

```
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = start_time,
            ended_at = end_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q1_2019 <- rename(q1_2019,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = start_time,
            ended_at = end_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q2_2019 <- rename(q2_2019,
            ride_id = "01 - Rental Details Rental ID",
            rideable_type = "01 - Rental Details Bike ID",
            started_at = "01 - Rental Details Local Start Time",
            ended_at = "01 - Rental Details Local End Time",
            start_station_name = "03 - Rental Start Station Name",
            start_station_id = "03 - Rental Start Station ID",
            end_station_name = "02 - Rental End Station Name",
            end_station_id = "02 - Rental End Station ID",
            member_casual = "User Type")
q3_2019 <- rename(q3_2019,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = start_time,
            ended_at = end_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)
q4_2019 <- rename(q4_2019,
            ride_id = trip_id,
            rideable_type = bikeid,
            started_at = start_time,
            ended_at = end_time,
```

```
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = usertype)

# Converting data types into characters to stack them together

## ride_id and rideable_type turned into characters
all_2013 <-  mutate(all_2013, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q1_q2_2014 <-  mutate(q1_q2_2014, ride_id = as.character(ride_id),
                rideable_type = as.character(rideable_type))
q3_2014_07 <-  mutate(q3_2014_07, ride_id = as.character(ride_id),
                rideable_type = as.character(rideable_type))
q3_2014_08_09 <-  mutate(q3_2014_08_09, ride_id = as.character(ride_id),
                  rideable_type = as.character(rideable_type))
q4_2014 <-  mutate(q4_2014, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q1_2015 <-  mutate(q1_2015, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q2_2015 <-  mutate(q2_2015, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q3_2015_07 <-  mutate(q3_2015_07, ride_id = as.character(ride_id),
                rideable_type = as.character(rideable_type))
q3_2015_08 <-  mutate(q3_2015_08, ride_id = as.character(ride_id),
                rideable_type = as.character(rideable_type))
q3_2015_09 <-  mutate(q3_2015_09, ride_id = as.character(ride_id),
                rideable_type = as.character(rideable_type))
q4_2015 <-  mutate(all_2013, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q1_2016 <-  mutate(q1_2016, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q2_2016_04 <-  mutate(q2_2016_04, ride_id = as.character(ride_id),
                rideable_type = as.character(rideable_type))
q2_2016_05 <-  mutate(q2_2016_05, ride_id = as.character(ride_id),
                rideable_type = as.character(rideable_type))
q2_2016_06 <-  mutate(q2_2016_06, ride_id = as.character(ride_id),
                rideable_type = as.character(rideable_type))
q3_2016 <-  mutate(q3_2016, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q4_2016 <-  mutate(q4_2016, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q1_2017 <-  mutate(q1_2017, ride_id = as.character(ride_id),
```

```
            rideable_type = as.character(rideable_type))
q2_2017 <-  mutate(q2_2017, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q3_2017 <-  mutate(q3_2017, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q4_2017 <-  mutate(q4_2017, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q1_2018 <-  mutate(q1_2018, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q2_2018 <-  mutate(q2_2018, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q3_2018 <-  mutate(q3_2018, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q4_2018 <-  mutate(q4_2018, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q1_2019 <-  mutate(q1_2019, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q2_2019 <-  mutate(q2_2019, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q3_2019 <-  mutate(q3_2019, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q4_2019 <-  mutate(q4_2019, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q1_2020 <-  mutate(q1_2020, ride_id = as.character(ride_id),
            rideable_type = as.character(rideable_type))
q2_2020_04 <-  mutate(q2_2020_04, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q2_2020_05 <-  mutate(q2_2020_05, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q2_2020_06 <-  mutate(q2_2020_06, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q3_2020_07 <-  mutate(q3_2020_07, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q3_2020_08 <-  mutate(q3_2020_08, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q3_2020_09 <-  mutate(q3_2020_09, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q4_2020_10 <-  mutate(q4_2020_10, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q4_2020_11 <-  mutate(q4_2020_11, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q4_2020_12 <-  mutate(q4_2020_12, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q1_2021_01 <-  mutate(q1_2021_01, ride_id = as.character(ride_id),
```

```
              rideable_type = as.character(rideable_type))
q1_2021_02 <-  mutate(q1_2021_02, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q1_2021_03 <-  mutate(q1_2021_03, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q2_2021_04 <-  mutate(q2_2021_04, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q2_2021_05 <-  mutate(q2_2021_05, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q2_2021_06 <-  mutate(q2_2021_06, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q3_2021_07 <-  mutate(q3_2021_07, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q3_2021_08 <-  mutate(q3_2021_08, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q3_2021_09 <-  mutate(q3_2021_09, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q4_2021_10 <-  mutate(q4_2021_10, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q4_2021_11 <-  mutate(q4_2021_11, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))
q4_2021_12 <-  mutate(q4_2021_12, ride_id = as.character(ride_id),
              rideable_type = as.character(rideable_type))

## date columns turned into POSIXct, tables with problems to convert data type have been
exported into excel and problem fixed

### Installing packages
install.packages('Rcpp')

### Setting the environment
library(readxl)

### Setting the working directory for excel files

setwd("/Users/goktugyaman/Documents/Data_Analysis_Case_Study/Excels")

### Importing the files after csv's splitted through terminal via split command
n_q1_q2_2014 <- read_excel("2014_Q1Q2.xlsx")
n_q3_2014_07 <- read_excel("2014_Q3_07.xlsx")
n_q3_2014_08_09 <- read_excel("2014_Q3_0809.xlsx")
n_q4_2014 <- read_excel("2014_Q4.xlsx")
n_q1_2015 <- read_excel("2015_Q1.xlsx")
n_q2_2015 <- read_excel("2015_Q2.xlsx")
```

```
n_q3_2015_07 <- read_excel("2015_Q3_07.xlsx")
n_q3_2015_08 <- read_excel("2015_Q3_08.xlsx")
n_q3_2015_09 <- read_excel("2015_Q3_09.xlsx")
n_q4_2015 <- read_excel("2015_Q4.xlsx")
n_q1_2016 <- read_excel("2016_Q1.xlsx")
n_q2_2016_04_05 <- read_excel("2016_Q2_04_05.xlsx")
n_q2_2016_06 <- read_excel("2016_Q2_06.xlsx")
n_q3_2016_01 <- read_excel("2016_Q3_1.xlsx")
n_q3_2016_02 <- read_excel("2016_Q3_2.xlsx")
n_q4_2016 <- read_excel("2016_Q4.xlsx")
n_q1_2017 <- read_excel("2017_Q1.xlsx")
n_q2_2017_01 <- read_excel("2017_Q2_1.xlsx")
n_q2_2017_02 <- read_excel("2017_Q2_2.xlsx")
n_q3_2017_01 <- read_excel("2017_Q3_1.xlsx")
n_q3_2017_02 <- read_excel("2017_Q3_2.xlsx")
n_q4_2017 <- read_excel("2017_Q4.xlsx")

### Adujusting column names
n_q1_q2_2014 <- rename(n_q1_q2_2014,
                ride_id = trip_id,
                started_at = start_time,
                ended_at = stop_time,
                start_station_id = from_station_id,
                start_station_name = from_station_name,
                end_station_id = to_station_id,
                end_station_name = to_station_name,
                member_casual = user_type)
n_q3_2014_07 <- rename(n_q3_2014_07,
                ride_id = trip_id,
                started_at = start_time,
                ended_at = stop_time,
                start_station_id = from_station_id,
                start_station_name = from_station_name,
                end_station_id = to_station_id,
                end_station_name = to_station_name,
                member_casual = user_type)
n_q3_2014_08_09 <- rename(n_q3_2014_08_09,
                  ride_id = trip_id,
                  started_at = start_time,
                  ended_at = stop_time,
                  start_station_id = from_station_id,
                  start_station_name = from_station_name,
                  end_station_id = to_station_id,
                  end_station_name = to_station_name,
```

```
                member_casual = user_type)
n_q4_2014 <- rename(n_q4_2014,
            ride_id = trip_id,
            started_at = start_time,
            ended_at = stop_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = user_type)
n_q1_2015 <- rename(n_q1_2015,
            ride_id = trip_id,
            started_at = start_time,
            ended_at = stop_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = user_type)
n_q2_2015 <- rename(n_q2_2015,
            ride_id = trip_id,
            started_at = start_time,
            ended_at = stop_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = user_type)
n_q3_2015_07 <- rename(n_q3_2015_07,
              ride_id = trip_id,
              started_at = start_time,
              ended_at = stop_time,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
              end_station_name = to_station_name,
              member_casual = user_type)
n_q3_2015_08 <- rename(n_q3_2015_08,
              ride_id = trip_id,
              started_at = start_time,
              ended_at = stop_time,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
```

```
              end_station_name = to_station_name,
              member_casual = user_type)
n_q3_2015_09 <- rename(n_q3_2015_09,
              ride_id = trip_id,
              started_at = start_time,
              ended_at = stop_time,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
              end_station_name = to_station_name,
              member_casual = user_type)
n_q4_2015 <- rename(n_q4_2015,
            ride_id = trip_id,
            started_at = start_time,
            ended_at = stop_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = user_type)
n_q1_2016 <- rename(n_q1_2016,
            ride_id = trip_id,
            started_at = start_time,
            ended_at = stop_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = user_type)
n_q2_2016_04_05 <- rename(n_q2_2016_04_05,
                ride_id = trip_id,
                started_at = start_time,
                ended_at = stop_time,
                start_station_id = from_station_id,
                start_station_name = from_station_name,
                end_station_id = to_station_id,
                end_station_name = to_station_name,
                member_casual = user_type)
n_q2_2016_06 <- rename(n_q2_2016_06,
              ride_id = trip_id,
              started_at = start_time,
              ended_at = stop_time,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
```

```
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = user_type)
n_q3_2016_01 <- rename(n_q3_2016_01,
            ride_id = trip_id,
            started_at = start_time,
            ended_at = stop_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = user_type)
n_q3_2016_02 <- rename(n_q3_2016_02,
            ride_id = trip_id,
            started_at = start_time,
            ended_at = stop_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = user_type)
n_q4_2016 <- rename(n_q4_2016,
            ride_id = trip_id,
            started_at = start_time,
            ended_at = stop_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = user_type)
n_q1_2017 <- rename(n_q1_2017,
            ride_id = trip_id,
            started_at = start_time,
            ended_at = stop_time,
            start_station_id = from_station_id,
            start_station_name = from_station_name,
            end_station_id = to_station_id,
            end_station_name = to_station_name,
            member_casual = user_type)
n_q2_2017_01 <- rename(n_q2_2017_01,
            ride_id = trip_id,
            started_at = start_time,
            ended_at = stop_time,
            start_station_id = from_station_id,
```

```
                start_station_name = from_station_name,
                end_station_id = to_station_id,
                end_station_name = to_station_name,
                member_casual = user_type)
n_q2_2017_02 <- rename(n_q2_2017_02,
                ride_id = trip_id,
                started_at = start_time,
                ended_at = stop_time,
                start_station_id = from_station_id,
                start_station_name = from_station_name,
                end_station_id = to_station_id,
                end_station_name = to_station_name,
                member_casual = user_type)
n_q3_2017_01 <- rename(n_q3_2017_01,
                ride_id = trip_id,
                started_at = start_time,
                ended_at = stop_time,
                start_station_id = from_station_id,
                start_station_name = from_station_name,
                end_station_id = to_station_id,
                end_station_name = to_station_name,
                member_casual = user_type)
n_q3_2017_02 <- rename(n_q3_2017_02,
                ride_id = trip_id,
                started_at = start_time,
                ended_at = stop_time,
                start_station_id = from_station_id,
                start_station_name = from_station_name,
                end_station_id = to_station_id,
                end_station_name = to_station_name,
                member_casual = user_type)
n_q4_2017 <- rename(n_q4_2017,
              ride_id = trip_id,
              started_at = start_time,
              ended_at = stop_time,
              start_station_id = from_station_id,
              start_station_name = from_station_name,
              end_station_id = to_station_id,
              end_station_name = to_station_name,
              member_casual = user_type)

### Converting ride_id, end_station_id, and start_staiton_id columns into character type
n_q1_q2_2014 <- mutate(n_q1_q2_2014, ride_id = as.character(ride_id))
n_q3_2014_07 <- mutate(n_q3_2014_07, ride_id = as.character(ride_id))
```

```
n_q3_2014_08_09 <- mutate(n_q3_2014_08_09, ride_id = as.character(ride_id))
n_q4_2014 <- mutate(n_q4_2014, ride_id = as.character(ride_id))
n_q1_2015 <- mutate(n_q1_2015, ride_id = as.character(ride_id))
n_q2_2015 <- mutate(n_q2_2015, ride_id = as.character(ride_id))
n_q3_2015_07 <- mutate(n_q3_2015_07, ride_id = as.character(ride_id))
n_q3_2015_08 <- mutate(n_q3_2015_08, ride_id = as.character(ride_id))
n_q3_2015_09 <- mutate(n_q3_2015_09, ride_id = as.character(ride_id))
n_q4_2015 <- mutate(n_q4_2015, ride_id = as.character(ride_id))
n_q1_2016 <- mutate(n_q1_2016, ride_id = as.character(ride_id))
n_q2_2016_04_05 <- mutate(n_q2_2016_04_05, ride_id = as.character(ride_id))
n_q2_2016_06 <- mutate(n_q2_2016_06, ride_id = as.character(ride_id))
n_q3_2016_01 <- mutate(n_q3_2016_01, ride_id = as.character(ride_id))
n_q3_2016_02 <- mutate(n_q3_2016_02, ride_id = as.character(ride_id))
n_q4_2016 <- mutate(n_q4_2016, ride_id = as.character(ride_id))
n_q1_2017 <- mutate(n_q1_2017, ride_id = as.character(ride_id))
n_q2_2017_01 <- mutate(n_q2_2017_01, ride_id = as.character(ride_id))
n_q2_2017_02 <- mutate(n_q2_2017_02, ride_id = as.character(ride_id))
n_q3_2017_01 <- mutate(n_q3_2017_01, ride_id = as.character(ride_id))
n_q3_2017_02 <- mutate(n_q3_2017_02, ride_id = as.character(ride_id))
n_q4_2017 <- mutate(n_q4_2017, ride_id = as.character(ride_id))

n_q1_q2_2014 <- mutate(n_q1_q2_2014, start_station_id = as.character(start_station_id))
n_q3_2014_07 <- mutate(n_q3_2014_07, start_station_id = as.character(start_station_id))
n_q3_2014_08_09 <- mutate(n_q3_2014_08_09, start_station_id =
as.character(start_station_id))
n_q4_2014 <- mutate(n_q4_2014, start_station_id = as.character(start_station_id))
n_q1_2015 <- mutate(n_q1_2015, start_station_id = as.character(start_station_id))
n_q2_2015 <- mutate(n_q2_2015, start_station_id = as.character(start_station_id))
n_q3_2015_07 <- mutate(n_q3_2015_07, start_station_id = as.character(start_station_id))
n_q3_2015_08 <- mutate(n_q3_2015_08, start_station_id = as.character(start_station_id))
n_q3_2015_09 <- mutate(n_q3_2015_09, start_station_id = as.character(start_station_id))
n_q4_2015 <- mutate(n_q4_2015, start_station_id = as.character(start_station_id))
n_q1_2016 <- mutate(n_q1_2016, start_station_id = as.character(start_station_id))
n_q2_2016_04_05 <- mutate(n_q2_2016_04_05, start_station_id =
as.character(start_station_id))
n_q2_2016_06 <- mutate(n_q2_2016_06, start_station_id = as.character(start_station_id))
n_q3_2016_01 <- mutate(n_q3_2016_01, start_station_id = as.character(start_station_id))
n_q3_2016_02 <- mutate(n_q3_2016_02, start_station_id = as.character(start_station_id))
n_q4_2016 <- mutate(n_q4_2016, start_station_id = as.character(start_station_id))
n_q1_2017 <- mutate(n_q1_2017, start_station_id = as.character(start_station_id))
n_q2_2017_01 <- mutate(n_q2_2017_01, start_station_id = as.character(start_station_id))
n_q2_2017_02 <- mutate(n_q2_2017_02, start_station_id = as.character(start_station_id))
n_q3_2017_01 <- mutate(n_q3_2017_01, start_station_id = as.character(start_station_id))
n_q3_2017_02 <- mutate(n_q3_2017_02, start_station_id = as.character(start_station_id))
```

```
n_q4_2017 <- mutate(n_q4_2017, start_station_id = as.character(start_station_id))
q1_2021_01 <- mutate(q1_2021_01, start_station_id = as.character(start_station_id))
q1_2021_02 <- mutate(q1_2021_02, start_station_id = as.character(start_station_id))
q1_2021_03 <- mutate(q1_2021_03, start_station_id = as.character(start_station_id))
q2_2021_04 <- mutate(q2_2021_04, start_station_id = as.character(start_station_id))
q2_2021_05 <- mutate(q2_2021_05, start_station_id = as.character(start_station_id))
q2_2021_06 <- mutate(q2_2021_06, start_station_id = as.character(start_station_id))
q3_2021_07 <- mutate(q3_2021_07, start_station_id = as.character(start_station_id))
q3_2021_08 <- mutate(q3_2021_08, start_station_id = as.character(start_station_id))
q3_2021_09 <- mutate(q3_2021_09, start_station_id = as.character(start_station_id))
q4_2021_10 <- mutate(q4_2021_10, start_station_id = as.character(start_station_id))
q4_2021_11 <- mutate(q4_2021_11, start_station_id = as.character(start_station_id))
q4_2021_12 <- mutate(q4_2021_12, start_station_id = as.character(start_station_id))
q1_2020 <- mutate(q1_2020, start_station_id = as.character(start_station_id))
q2_2020_04 <- mutate(q2_2020_04, start_station_id = as.character(start_station_id))
q2_2020_05 <- mutate(q2_2020_05, start_station_id = as.character(start_station_id))
q2_2020_06 <- mutate(q2_2020_06, start_station_id = as.character(start_station_id))
q3_2020_07 <- mutate(q3_2020_07, start_station_id = as.character(start_station_id))
q3_2020_08 <- mutate(q3_2020_08, start_station_id = as.character(start_station_id))
q3_2020_09 <- mutate(q3_2020_09, start_station_id = as.character(start_station_id))
q4_2020_10 <- mutate(q4_2020_10, start_station_id = as.character(start_station_id))
q4_2020_11 <- mutate(q4_2020_11, start_station_id = as.character(start_station_id))
q4_2020_12 <- mutate(q4_2020_12, start_station_id = as.character(start_station_id))
q1_2018 <- mutate(q1_2018, start_station_id = as.character(start_station_id))
q2_2018 <- mutate(q2_2018, start_station_id = as.character(start_station_id))
q3_2018 <- mutate(q3_2018, start_station_id = as.character(start_station_id))
q4_2018 <- mutate(q4_2018, start_station_id = as.character(start_station_id))
q1_2019 <- mutate(q1_2019, start_station_id = as.character(start_station_id))
q2_2019 <- mutate(q2_2019, start_station_id = as.character(start_station_id))
q3_2019 <- mutate(q3_2019, start_station_id = as.character(start_station_id))
q4_2019 <- mutate(q4_2019, start_station_id = as.character(start_station_id))
all_2013 <- mutate(all_2013, start_station_id = as.character(start_station_id))

n_q1_q2_2014 <- mutate(n_q1_q2_2014, end_station_id = as.character(end_station_id))
n_q3_2014_07 <- mutate(n_q3_2014_07, end_station_id = as.character(end_station_id))
n_q3_2014_08_09 <- mutate(n_q3_2014_08_09, end_station_id =
as.character(end_station_id))
n_q4_2014 <- mutate(n_q4_2014, end_station_id = as.character(end_station_id))
n_q1_2015 <- mutate(n_q1_2015, end_station_id = as.character(end_station_id))
n_q2_2015 <- mutate(n_q2_2015, end_station_id = as.character(end_station_id))
n_q3_2015_07 <- mutate(n_q3_2015_07, end_station_id = as.character(end_station_id))
n_q3_2015_08 <- mutate(n_q3_2015_08, end_station_id = as.character(end_station_id))
n_q3_2015_09 <- mutate(n_q3_2015_09, end_station_id = as.character(end_station_id))
n_q4_2015 <- mutate(n_q4_2015, end_station_id = as.character(end_station_id))
```

```
n_q1_2016 <- mutate(n_q1_2016, end_station_id = as.character(end_station_id))
n_q2_2016_04_05 <- mutate(n_q2_2016_04_05, end_station_id =
as.character(end_station_id))
n_q2_2016_06 <- mutate(n_q2_2016_06, end_station_id = as.character(end_station_id))
n_q3_2016_01 <- mutate(n_q3_2016_01, end_station_id = as.character(end_station_id))
n_q3_2016_02 <- mutate(n_q3_2016_02, end_station_id = as.character(end_station_id))
n_q4_2016 <- mutate(n_q4_2016, end_station_id = as.character(end_station_id))
n_q1_2017 <- mutate(n_q1_2017, end_station_id = as.character(end_station_id))
n_q2_2017_01 <- mutate(n_q2_2017_01, end_station_id = as.character(end_station_id))
n_q2_2017_02 <- mutate(n_q2_2017_02, end_station_id = as.character(end_station_id))
n_q3_2017_01 <- mutate(n_q3_2017_01, end_station_id = as.character(end_station_id))
n_q3_2017_02 <- mutate(n_q3_2017_02, end_station_id = as.character(end_station_id))
n_q4_2017 <- mutate(n_q4_2017, end_station_id = as.character(end_station_id))
q1_2021_01 <- mutate(q1_2021_01, end_station_id = as.character(end_station_id))
q1_2021_02 <- mutate(q1_2021_02, end_station_id = as.character(end_station_id))
q1_2021_03 <- mutate(q1_2021_03, end_station_id = as.character(end_station_id))
q2_2021_04 <- mutate(q2_2021_04, end_station_id = as.character(end_station_id))
q2_2021_05 <- mutate(q2_2021_05, end_station_id = as.character(end_station_id))
q2_2021_06 <- mutate(q2_2021_06, end_station_id = as.character(end_station_id))
q3_2021_07 <- mutate(q3_2021_07, end_station_id = as.character(end_station_id))
q3_2021_08 <- mutate(q3_2021_08, end_station_id = as.character(end_station_id))
q3_2021_09 <- mutate(q3_2021_09, end_station_id = as.character(end_station_id))
q4_2021_10 <- mutate(q4_2021_10, end_station_id = as.character(end_station_id))
q4_2021_11 <- mutate(q4_2021_11, end_station_id = as.character(end_station_id))
q4_2021_12 <- mutate(q4_2021_12, end_station_id = as.character(end_station_id))
q1_2020 <- mutate(q1_2020, end_station_id = as.character(end_station_id))
q2_2020_04 <- mutate(q2_2020_04, end_station_id = as.character(end_station_id))
q2_2020_05 <- mutate(q2_2020_05, end_station_id = as.character(end_station_id))
q2_2020_06 <- mutate(q2_2020_06, end_station_id = as.character(end_station_id))
q3_2020_07 <- mutate(q3_2020_07, end_station_id = as.character(end_station_id))
q3_2020_08 <- mutate(q3_2020_08, end_station_id = as.character(end_station_id))
q3_2020_09 <- mutate(q3_2020_09, end_station_id = as.character(end_station_id))
q4_2020_10 <- mutate(q4_2020_10, end_station_id = as.character(end_station_id))
q4_2020_11 <- mutate(q4_2020_11, end_station_id = as.character(end_station_id))
q4_2020_12 <- mutate(q4_2020_12, end_station_id = as.character(end_station_id))
q1_2018 <- mutate(q1_2018, end_station_id = as.character(end_station_id))
q2_2018 <- mutate(q2_2018, end_station_id = as.character(end_station_id))
q3_2018 <- mutate(q3_2018, end_station_id = as.character(end_station_id))
q4_2018 <- mutate(q4_2018, end_station_id = as.character(end_station_id))
q1_2019 <- mutate(q1_2019, end_station_id = as.character(end_station_id))
q2_2019 <- mutate(q2_2019, end_station_id = as.character(end_station_id))
q3_2019 <- mutate(q3_2019, end_station_id = as.character(end_station_id))
q4_2019 <- mutate(q4_2019, end_station_id = as.character(end_station_id))
all_2013 <- mutate(all_2013, end_station_id = as.character(end_station_id))
```

```
# Combining tables
all_trips <- bind_rows(all_2013,
                       n_q1_q2_2014, n_q3_2014_07, n_q3_2014_08_09, n_q4_2014,
                       n_q1_2015, n_q2_2015, n_q3_2015_07, n_q3_2015_08, n_q3_2015_09,
n_q4_2015,
                       n_q1_2016, n_q2_2016_04_05, n_q2_2016_06, n_q3_2016_01, n_q3_2016_02,
n_q4_2016,
                       n_q1_2017, n_q2_2017_01, n_q2_2017_02, n_q3_2017_01, n_q3_2017_02,
n_q4_2017,
                       q1_2018, q2_2018, q3_2018, q4_2018,
                       q1_2019, q2_2019, q3_2019, q4_2019,
                       q1_2020, q2_2020_04, q2_2020_05, q2_2020_06, q3_2020_07, q3_2020_08,
q3_2020_09, q4_2020_10, q4_2020_11, q4_2020_12,
                       q1_2021_01, q1_2021_02, q1_2021_03, q2_2021_04, q2_2021_05, q2_2021_06,
q3_2021_07, q3_2021_08, q3_2021_09, q4_2021_10, q4_2021_11, q4_2021_12)

# Cleaning the data environment to open up space on RAM
rm(q3_2015_07,
   q3_2015_08,
   q3_2015_09,
   q1_2015,
   q1_2016,
   q1_2017,
   q1_q2_2014,
   q2_2015,
   q2_2016_04,
   q2_2016_05,
   q2_2016_06,
   q2_2017,
   q3_2014_07,
   q3_2014_08_09,
   q3_2016,
   q3_2017,
   q4_2014,
   q4_2015,
   q4_2016,
   q4_2017,
   n_q1_q2_2014,
   n_q3_2014_07,
   n_q3_2014_08_09,
   n_q4_2014,
   n_q1_2015,
   n_q2_2015,
```

n_q3_2015_07,
n_q3_2015_08,
n_q3_2015_09,
n_q4_2015,
n_q1_2016,
n_q2_2016_04_05,
n_q2_2016_06,
n_q3_2016_01,
n_q3_2016_02,
n_q4_2016,
n_q1_2017,
n_q2_2017_01,
n_q2_2017_02,
n_q3_2017_01,
n_q3_2017_02,
n_q4_2017,
n_q1_q2_2014,
n_q3_2014_07,
n_q3_2014_08_09,
n_q4_2014,
n_q1_2015,
n_q2_2015,
n_q3_2015_07,
n_q3_2015_08,
n_q3_2015_09,
n_q4_2015,
n_q1_2016,
n_q2_2016_04_05,
n_q2_2016_06,
n_q3_2016_01,
n_q3_2016_02,
n_q4_2016,
n_q1_2017,
n_q2_2017_01,
n_q2_2017_02,
n_q3_2017_01,
n_q3_2017_02,
n_q4_2017,
q1_2021_01,
q1_2021_02,
q1_2021_03,
q2_2021_04,
q2_2021_05,
q2_2021_06,

q3_2021_07,
q3_2021_08,
q3_2021_09,
q4_2021_10,
q4_2021_11,
q4_2021_12,
q1_2020,
q2_2020_04,
q2_2020_05,
q2_2020_06,
q3_2020_07,
q3_2020_08,
q3_2020_09,
q4_2020_10,
q4_2020_11,
q4_2020_12,
q1_2018,
q2_2018,
q3_2018,
q4_2018,
q1_2019,
q2_2019,
q3_2019,
q4_2019,
all_2013,
n_q1_q2_2014,
n_q3_2014_07,
n_q3_2014_08_09,
n_q4_2014,
n_q1_2015,
n_q2_2015,
n_q3_2015_07,
n_q3_2015_08,
n_q3_2015_09,
n_q4_2015,
n_q1_2016,
n_q2_2016_04_05,
n_q2_2016_06,
n_q3_2016_01,
n_q3_2016_02,
n_q4_2016,
n_q1_2017,
n_q2_2017_01,
n_q2_2017_02,

```
  n_q3_2017_01,
  n_q3_2017_02,
  n_q4_2017,
  q1_2021_01,
  q1_2021_02,
  q1_2021_03,
  q2_2021_04,
  q2_2021_05,
  q2_2021_06,
  q3_2021_07,
  q3_2021_08,
  q3_2021_09,
  q4_2021_10,
  q4_2021_11,
  q4_2021_12,
  q1_2020,
  q2_2020_04,
  q2_2020_05,
  q2_2020_06,
  q3_2020_07,
  q3_2020_08,
  q3_2020_09,
  q4_2020_10,
  q4_2020_11,
  q4_2020_12,
  q1_2018,
  q2_2018,
  q3_2018,
  q4_2018,
  q1_2019,
  q2_2019,
  q3_2019,
  q4_2019,
  all_2013)

# Standardizing member_casual column
all_trips <- mutate(all_trips, member_casual = recode(member_casual,
                                        "Subscriber" = "member",
                                        "Customer" = "casual",
                                        "Dependent" = "casual"))

# Adding columns for aggregation
all_trips$date <- as.Date(all_trips$started_at) #The default format is yyyy-mm-dd
all_trips$month <- format(as.Date(all_trips$date), "%m")
```

```
all_trips$day <- format(as.Date(all_trips$date), "%d")
all_trips$year <- format(as.Date(all_trips$date), "%Y")
all_trips$day_of_week <- format(as.Date(all_trips$date), "%A")

# Adding a column for ride_length into whole table
all_trips$ride_length <- difftime(all_trips$ended_at,all_trips$started_at)
all_trips$ride_length <- as.numeric(as.character(all_trips$ride_length))

# Dropping inconsistent and unrelated columns to analysis
all_trips <- all_trips %>%  select(-c("start_station_id",
                                      "end_station_id",
                                      "start_station_name",
                                      "end_station_name",
                                      "birthyear",
                                      "gender",
                                      "birthday",
                                      "trip_day",
                                      "01 - Rental Details Duration In Seconds Uncapped",
                                      "Member Gender",
                                      "05 - Member Details Member Birthday Year",
                                      "start_lat",
                                      "start_lng",
                                      "end_lat",
                                      "end_lng",
                                      "tripduration",
                                      "ride_id",
                                      "rideable_type"))


# Removing the trips that lasted less than 120 seconds in order to eliminate test rides and
untypical rides
all_trips_v2 <- all_trips[!(all_trips$ride_length<120),]
all_trips_v3 <- all_trips_v2

# Openinng up space on RAM
rm(all_trips)

# Fixing the ride lengths in last 4 years
all_trips_v3$ride_length <- ifelse(all_trips_v3$year == 2015, all_trips_v3$ride_length/1000,
all_trips_v3$ride_length)
rm(all_trips_v2)
all_trips_v4 <- all_trips_v3
all_trips_v4$ride_length <- ifelse(all_trips_v4$year == 2016, all_trips_v4$ride_length/1000,
all_trips_v4$ride_length)
```

```
rm(all_trips_v3)
all_trips_v5 <- all_trips_v4
all_trips_v5$ride_length <- ifelse(all_trips_v5$year == 2017, all_trips_v5$ride_length/1000,
all_trips_v5$ride_length)
all_trips_v6 <- all_trips_v5
rm(all_trips_v4)
all_trips_v6$ride_length <- ifelse(all_trips_v6$year == 2014, all_trips_v6$ride_length/10,
all_trips_v6$ride_length)
rm(all_trips_v5)

# Summary statistics (values in seconds)
summary(all_trips_v2$ride_length)
aggregate(all_trips_v2$ride_length ~ all_trips_v2$member_casual, FUN = mean)
aggregate(all_trips_v2$ride_length ~ all_trips_v2$member_casual, FUN = median)
aggregate(all_trips_v2$ride_length ~ all_trips_v2$member_casual, FUN = max)
aggregate(all_trips_v2$ride_length ~ all_trips_v2$member_casual, FUN = min)
aggregate(all_trips_v2$ride_length ~ all_trips_v2$member_casual + all_trips_v2$day_of_week,
FUN = mean)

# Sorting the data according to weekday
all_trips_v6$day_of_week <- ordered(all_trips_v6$day_of_week,
                                    levels=c("Monday", "Tuesday", "Wednesday", "Thursday", "Friday",
"Saturday", "Sunday"))

# Plotting the summary data
## Number of rides
### Daily
all_trips_v6 %>%
  group_by(member_casual, day_of_week) %>%
  summarise(number_of_rides = n()) %>%
  arrange(member_casual, day_of_week)  %>%
  ggplot(aes(x = day_of_week, y = number_of_rides, fill = member_casual)) +
  geom_col(position = "dodge") +
  scale_fill_manual(values = c("navy",
                               "maroon")) +
  labs(title = "Daily Number of Trips Taken", fill = "Member or Casual", x = "", y = "Number of
Daily Trips")
#### The daily number of different customer groups shows that the number of members is
always higher than the casual riders.
#### The number of members during weekends is lower than on weekdays but it is vice versa
for the casual riders.

### Monthly
all_trips_v6 %>%
```

```
  group_by(member_casual, month) %>%
  summarise(number_of_rides = n()) %>%
  arrange(member_casual, month)  %>%
  ggplot(aes(x = month, y = number_of_rides, fill = member_casual)) +
  geom_col(position = "dodge") +
  scale_fill_manual(values = c("navy",
                               "maroon")) +
  labs(title = "Monthly Number of Trips Taken", fill = "Member or Casual", x = "", y = "Number of
Monthly Trips")

### Yearly
all_trips_v6 %>%
  group_by(member_casual, year) %>%
  summarise(number_of_rides = n()) %>%
  arrange(member_casual, year)  %>%
  ggplot(aes(x = year, y = number_of_rides, fill = member_casual)) +
  geom_col(position = "dodge") +
  scale_fill_manual(values = c("navy",
                               "maroon")) +
  labs(title = "Yearly Number of Trips Taken", fill = "Member or Casual", x = "", y = "Number of
Yearly Trips")
#### More than half of the customers of Cyclistic are members.
#### The only exception is the Covid-19 period but the number of members is still higher than
casual riders.

## Ride length
### Daily
all_trips_v6 %>%
  group_by(member_casual, day_of_week) %>%
  summarize(ride_length = sum(ride_length)) %>%
  arrange(member_casual, day_of_week)  %>%
  ggplot(aes(x = day_of_week, y = ride_length, fill = member_casual)) +
  geom_col(position = "dodge") +
  scale_fill_manual(values = c("navy",
                               "maroon")) +
  labs(title = "Daily Total Trip Duration", fill = "Member or Casual", x = "", y = "Daily Trip
Duraiton")
#### Members are using the bikes with a similar frequency during the week.
#### Casual riders are preferring the weekends.
#### In total, weekends are the most used time of the week.

### Monthly Average
all_trips_v6 %>%
  group_by(member_casual, month) %>%
```

```
  summarize(ride_length = sum(ride_length)) %>%
  arrange(member_casual, month)  %>%
  ggplot(aes(x = month, y = ride_length, fill = member_casual)) +
  geom_col(position = "dodge") +
  scale_fill_manual(values = c("navy", "maroon")) +
  labs(title = "Monthly Total Trip Duration", fill = "Member or Casual", x = "", y = "Monthly Trip
Duraiton")
#### Summer has the highest demand for bikes for both customer groups.
#### Casual riders have a special interest during the summer.

### Yearly
all_trips_v6%>%
  group_by(member_casual, year) %>%
  summarize(ride_length = sum(ride_length)) %>%
  arrange(member_casual, year)  %>%
  ggplot(aes(x = year, y = ride_length, fill = member_casual)) +
  geom_col(position = "dodge") +
  scale_fill_manual(values = c("navy",
                               "maroon")) +
  labs(title = "Yearly Total Trip Duration", fill = "Member or Casual", x = "", y = "Yearly Trip
Duraiton")

#### Until Covid-19, both customer groups were contributing similarly.
#### After 2019, trips taken by members decreased.
#### Total trip duration stayed stable because the increase in casual riders during the period
compensated for the decrease in members.

# Recommendations
## Casual riders have a higher average trip duration, therefore, increasing the number of casual
riders will have a more significant marginal effect than the members. Preparing special
campaigns targeting casual riders will be more profitable for the company.
## Summer has the highest demand, prepare campaigns for summer focusing on both customer
groups in order to increase the number of total users instead of only focusing on the number of
members. Because this attempt may cause a decrease in the number of casual riders which has
a higher marginal effect on the revenue.
## Prepare campaigns for weekends since the demand is at the top on weekends.

# Food for tought
## Data includes observations about station locations of each trip. It is possible to run further
analysis on the density of the stations in order to replace advertisement tools and balance the
number of bikes docked at each station. Moreover, it is possible to manage the bike
distribution among stations seasonally since there are data available.
```