CSCI403 Analysis

```
library(emmeans)
```

```
## Welcome to emmeans.
## Caution: You lose important information if you filter this package's results.
## See '? untidy'
```

```
library(Stat2Data)
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.5
## v forcats   1.0.0     v stringr   1.5.1
## v ggplot2   3.5.1     v tibble    3.2.1
## v lubridate 1.9.3     v tidyr     1.3.1
## v purrr     1.0.2
```

```
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(mosaic)
```

```
## Registered S3 method overwritten by 'mosaic':
##   method                           from
##   fortify.SpatialPolygonsDataFrame ggplot2
##
## The 'mosaic' package masks several functions from core packages in order to add
## additional features.  The original behavior of these functions should not be affected by this.
##
## Attaching package: 'mosaic'
##
## The following object is masked from 'package:Matrix':
##
##     mean
##
## The following objects are masked from 'package:dplyr':
##
##     count, do, tally
##
## The following object is masked from 'package:purrr':
##
##     cross
##
## The following object is masked from 'package:ggplot2':
##
##     stat
##
## The following objects are masked from 'package:stats':
```

```
##
##     binom.test, cor, cor.test, cov, fivenum, IQR, median, prop.test,
##     quantile, sd, t.test, var
##
## The following objects are masked from 'package:base':
##
##     max, mean, min, prod, range, sample, sum
```

```
library(ggformula)
library(dplyr)

knitr::opts_chunk$set(echo = F)
evData <- read.csv("data/Electric Vehicle Data.csv")
```

First, we can start by checking to see if the electric vehicle type results in different electric ranges.

```
## # A tibble: 2 x 4
##   Electric.Vehicle.Type                     n  mean    sd
##   <chr>                                 <int> <dbl> <dbl>
## 1 Battery Electric Vehicle (BEV)        47189 198.   72.7
## 2 Plug-in Hybrid Electric Vehicle (PHEV) 48149  31.2  14.7
```

Do we have evidence to show that electric cars have increased in average range in 2020 compared to in 2019?

```
## # A tibble: 2 x 4
##   Model.Year     n  mean    sd
##        <int> <int> <dbl> <dbl>
## 1       2019  8898  210.  41.4
## 2       2020 10331  277.  40.3
```

```
##                Df   Sum Sq  Mean Sq F value Pr(>F)
## Model.Year      1 21547267 21547267   12928 <2e-16 ***
## Residuals   19227 32045493     1667
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##  contrast                        estimate   SE    df  t.ratio p.value
##  Model.Year2019 - Model.Year2020    -67.1 0.59 19227 -113.702  <.0001
```