RWorksheet_Cacho#4c

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```
# 1a
library(readr)
mpg <- read.table("mpg.csv", header = TRUE, sep = ",")
str(mpg)
```

```
## 'data.frame':    234 obs. of  12 variables:
##  $ X           : int  1 2 3 4 5 6 7 8 9 10 ...
##  $ manufacturer: chr  "audi" "audi" "audi" "audi" ...
##  $ model       : chr  "a4" "a4" "a4" "a4" ...
##  $ displ       : num  1.8 1.8 2 2 2.8 2.8 3.1 1.8 1.8 2 ...
##  $ year        : int  1999 1999 2008 2008 1999 1999 2008 1999 1999 2008 ...
##  $ cyl         : int  4 4 4 4 6 6 6 4 4 4 ...
##  $ trans       : chr  "auto(l5)" "manual(m5)" "manual(m6)" "auto(av)" ...
##  $ drv         : chr  "f" "f" "f" "f" ...
##  $ cty         : int  18 21 20 21 16 18 18 18 16 20 ...
##  $ hwy         : int  29 29 31 30 26 26 27 26 25 28 ...
##  $ fl          : chr  "p" "p" "p" "p" ...
##  $ class       : chr  "compact" "compact" "compact" "compact" ...
```

```
# 1b
#The categorical variables in the mpg dataset are manufacturer, model, trans, drv, fl, and class.


# 1c
#The continuous variables in the mpg dataset are displ, cty, and hwy.
```

```
# 2
# Manufacturer that has most models
manufacturer_model_count <- table(mpg$manufacturer)
most_models <- names(which.max(manufacturer_model_count))
most_models_count <- max(manufacturer_model_count)

# Model that has most variations
model_counts <- table(mpg$model)
most_variations_model <- names(which.max(model_counts))
most_variations_count <- max(model_counts)

most_models
```

```
## [1] "dodge"
```

```
most_models_count
```

```
## [1] 37
```

```r
most_variations_model
```

```
## [1] "caravan 2wd"
```

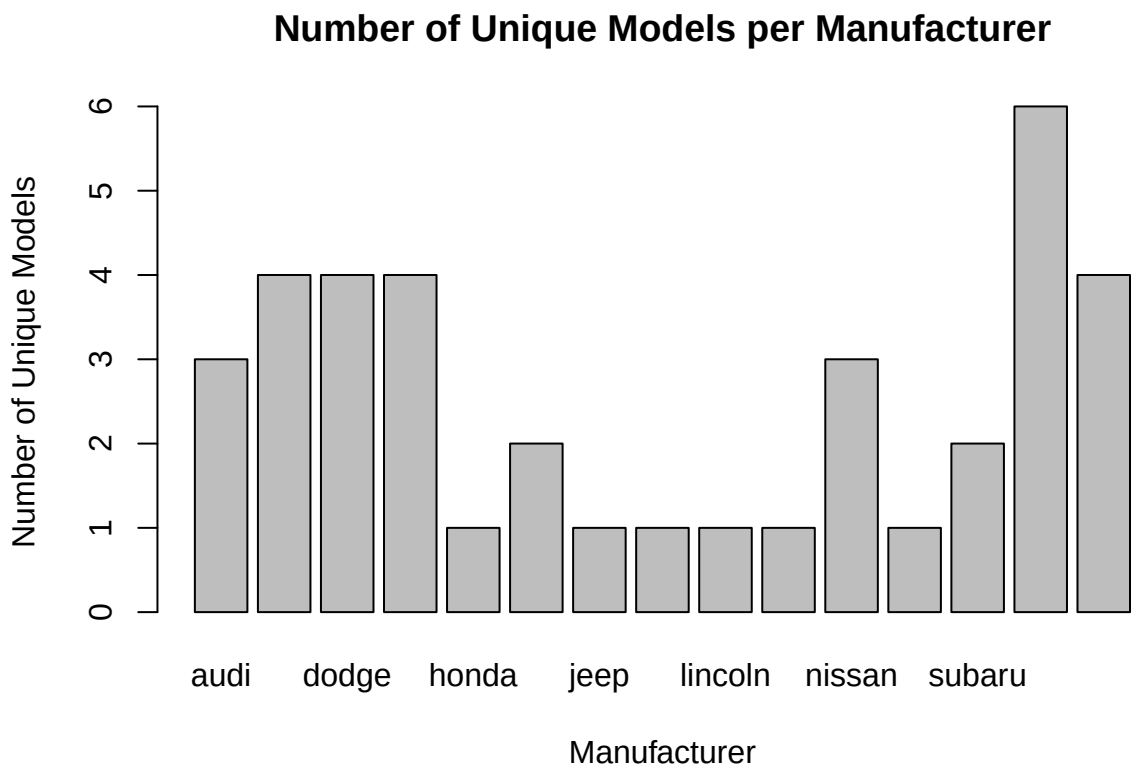
```r
most_variations_count
```

```
## [1] 11
```

```r
# 2a
manufacturers_unique_model <- aggregate(model ~ manufacturer, data = mpg, function(x) length(unique(x)))

manufacturers_unique_model
```

```
##    manufacturer model
## 1          audi     3
## 2     chevrolet     4
## 3         dodge     4
## 4          ford     4
## 5         honda     1
## 6       hyundai     2
## 7          jeep     1
## 8    land rover     1
## 9       lincoln     1
## 10      mercury     1
## 11       nissan     3
## 12      pontiac     1
## 13       subaru     2
## 14       toyota     6
## 15   volkswagen     4
```

```r
# 2b
barplot(manufacturers_unique_model$model,
        names.arg = manufacturers_unique_model$manufacturer,
        main = "Number of Unique Models per Manufacturer",
        xlab = "Manufacturer", ylab = "Number of Unique Models")
```

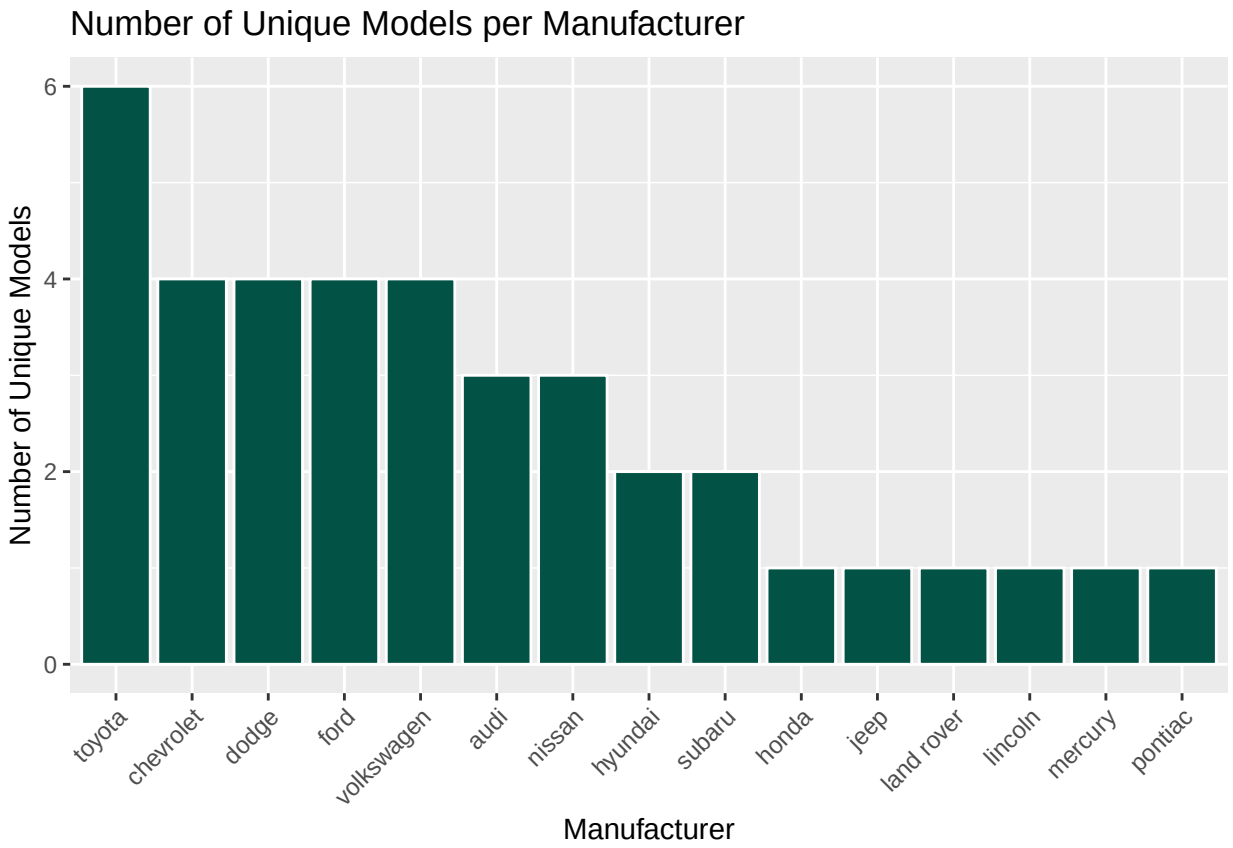



```
# Using ggplot2
library(ggplot2)
```

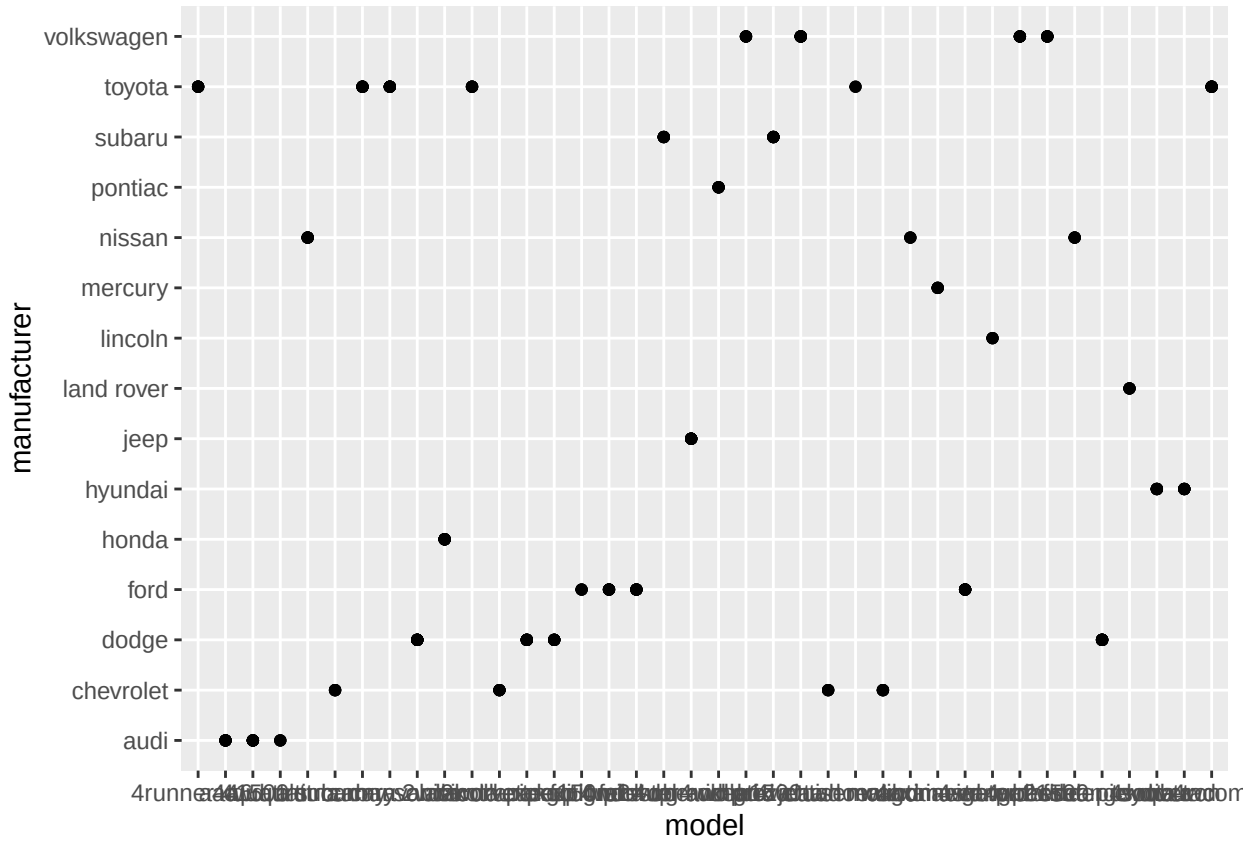
```
##
## Attaching package: 'ggplot2'
```

```
## The following object is masked _by_ '.GlobalEnv':
##
##     mpg
```

```
ggplot(manufacturers_unique_model, aes(x = reorder(manufacturer, -model), y = model)) +
  geom_bar(stat = "identity", fill = "#025245", color = "white") +
  labs(title = "Number of Unique Models per Manufacturer", x = "Manufacturer",
       y = "Number of Unique Models") +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```




```
# 2a
ggplot(mpg, aes(model, manufacturer)) + geom_point()
```



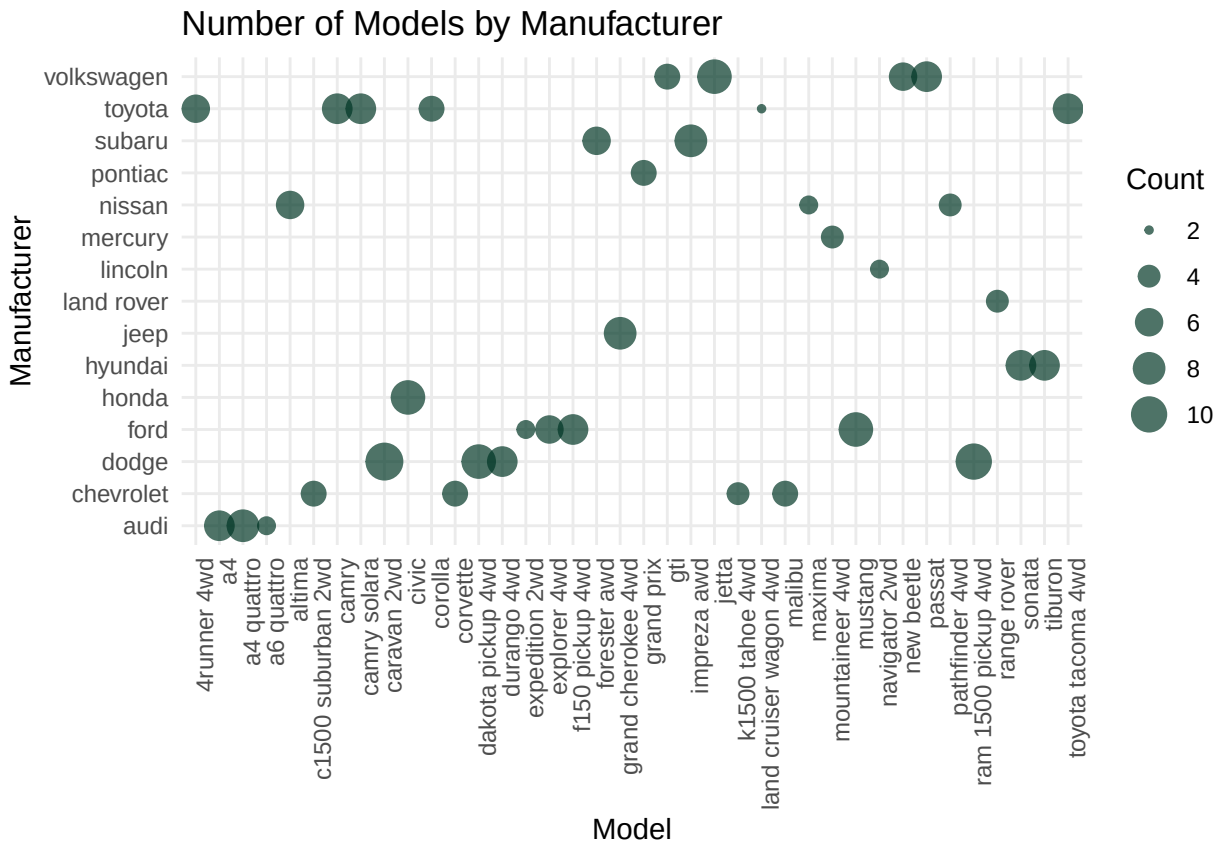

```
# 2b
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

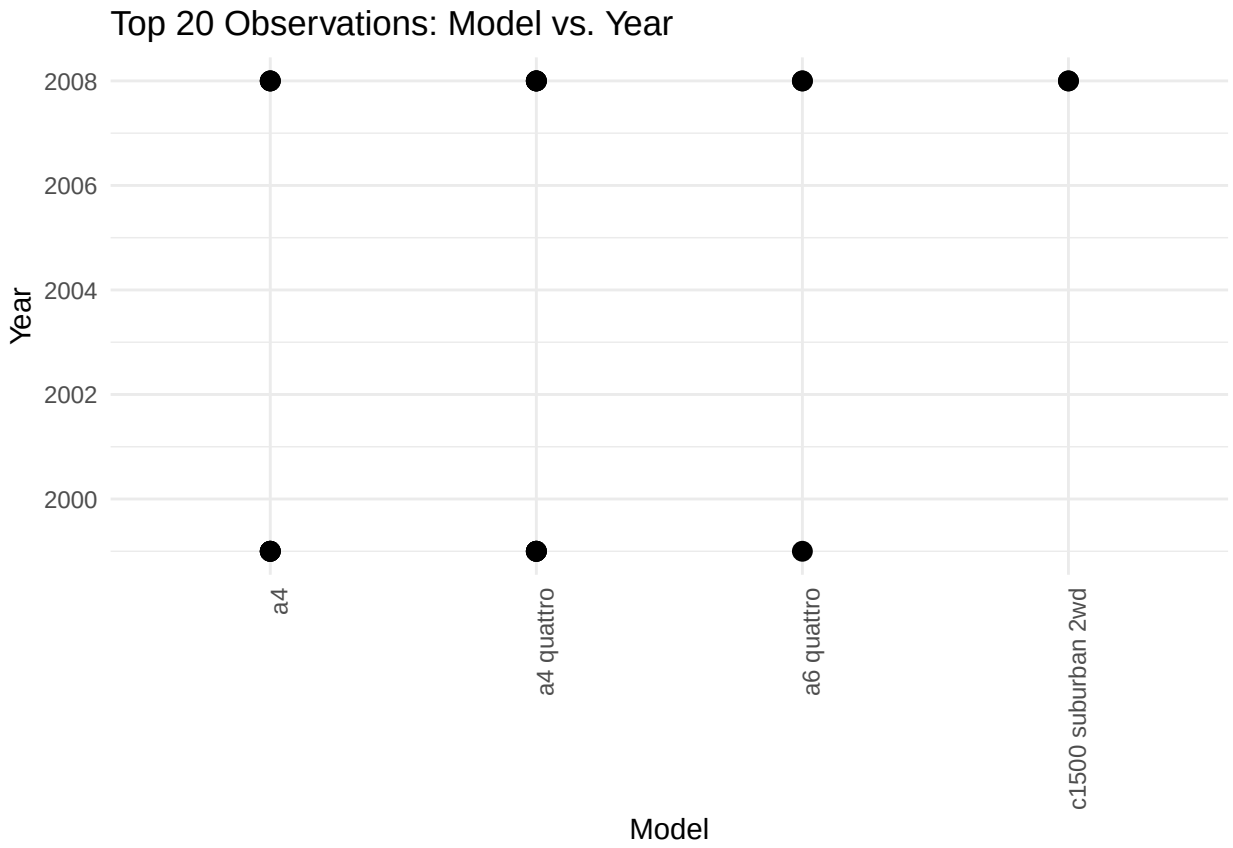
```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
model_counts <- mpg %>%
  group_by(manufacturer, model) %>%
  summarise(count = n(), .groups = "drop")

ggplot(model_counts, aes(x = model, y = manufacturer, size = count)) +
  geom_point(color = "#003625", alpha = 0.7) +
  theme_minimal() +
  labs(title = "Number of Models by Manufacturer",
       x = "Model",
       y = "Manufacturer",
       size = "Count") +
  theme(axis.text.x = element_text(angle = 90, hjust = 1))
```




```r
# 3
top_20_data <- mpg %>% slice_head(n = 20)

ggplot(top_20_data, aes(x = model, y = year)) +
  geom_point(color = "black", size = 3) +
  theme_minimal() +
  labs(title = "Top 20 Observations: Model vs. Year",
       x = "Model",
       y = "Year") +
  theme(axis.text.x = element_text(angle = 90, hjust = 1))
```

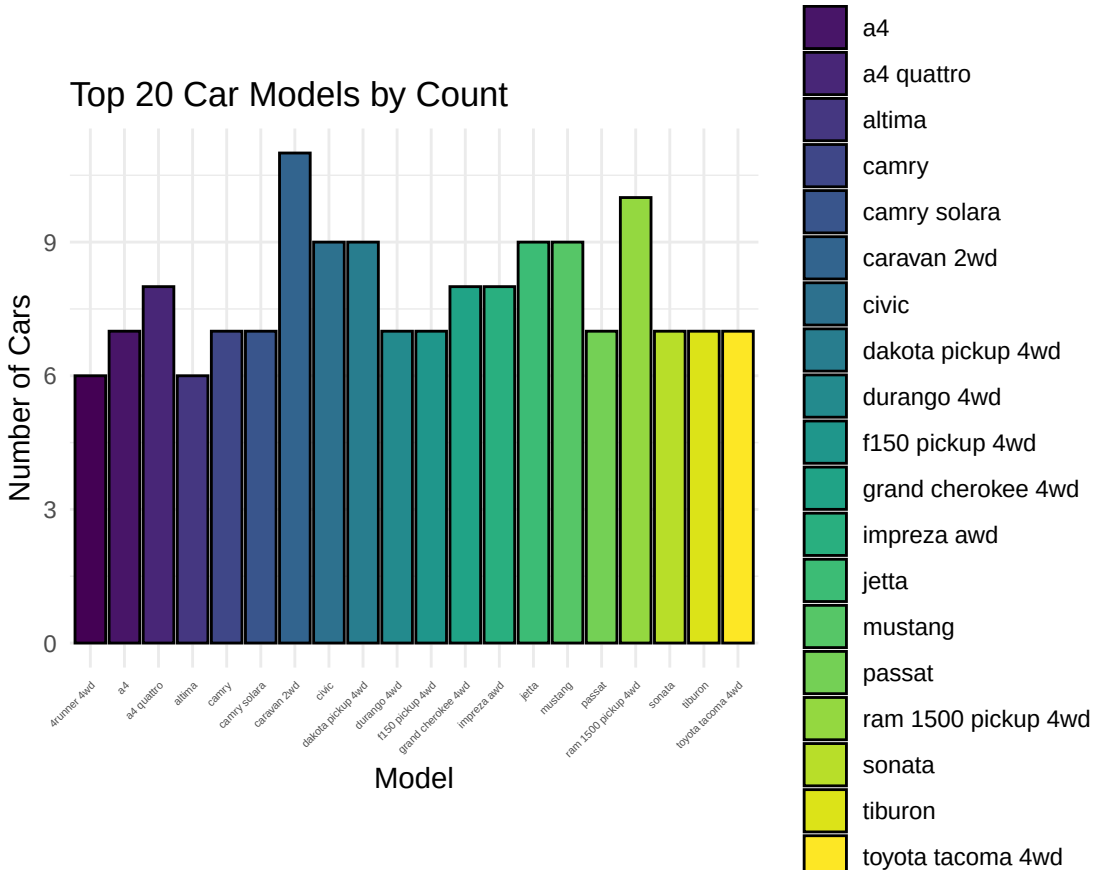



```
# 4
cars_per_model <- mpg %>%
  group_by(model) %>%
  summarise(count = n(), .groups = "drop")

cars_per_model
```

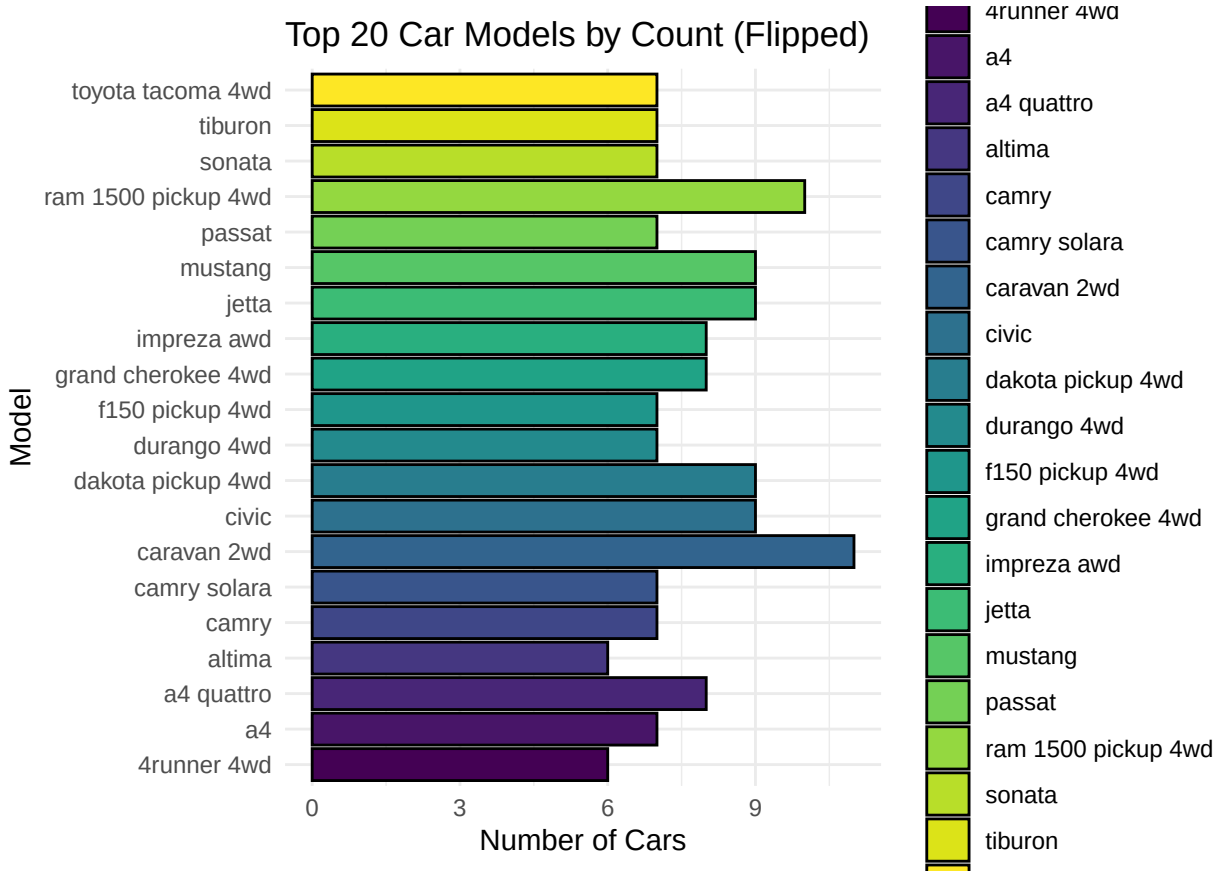
```
## # A tibble: 38 x 2
##    model              count
##    <chr>              <int>
##  1 4runner 4wd            6
##  2 a4                     7
##  3 a4 quattro             8
##  4 a6 quattro             3
##  5 altima                 6
##  6 c1500 suburban 2wd     5
##  7 camry                  7
##  8 camry solara           7
##  9 caravan 2wd           11
## 10 civic                  9
## # i 28 more rows
```

```
# 4a
top_20_models <- cars_per_model %>%
  arrange(desc(count)) %>%
  slice_head(n = 20)

ggplot(top_20_models, aes(x = model, y = count, fill = model)) +
```

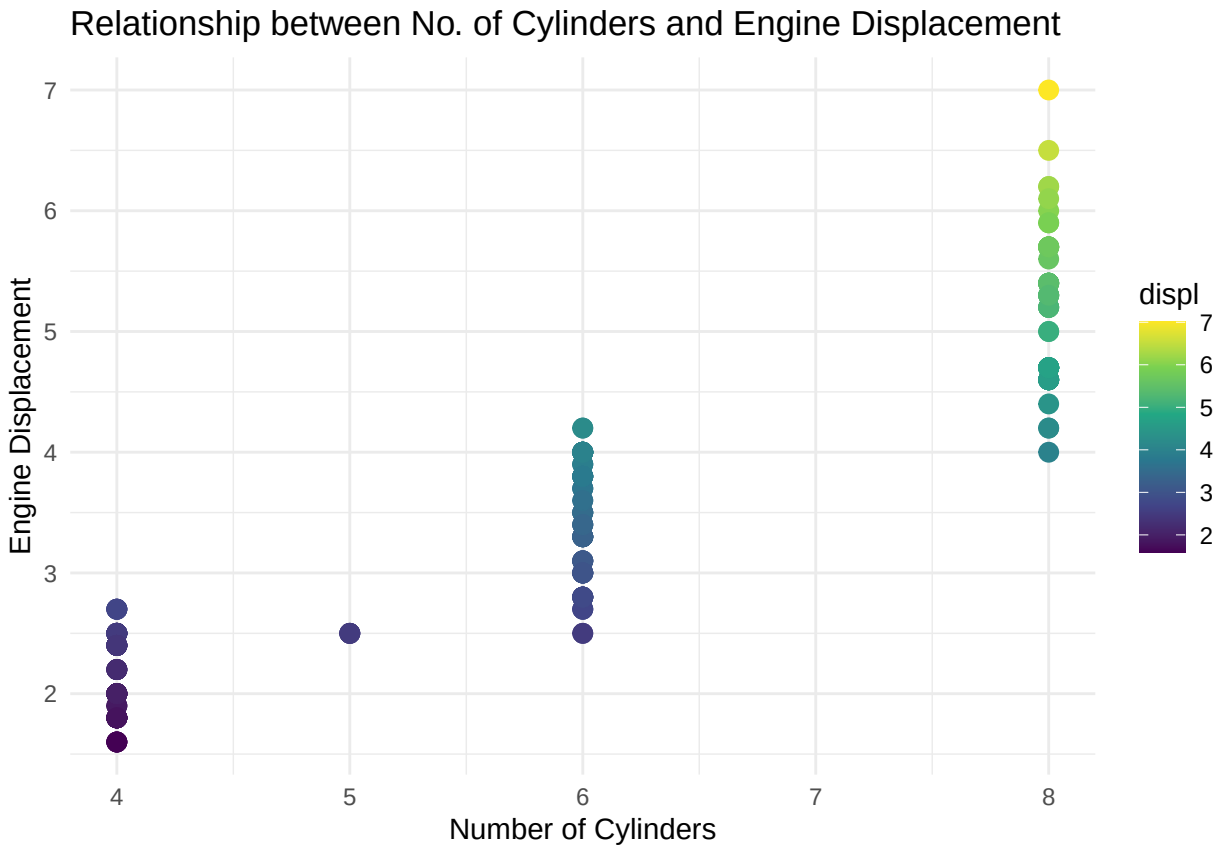
```
  geom_bar(stat = "identity", color = "black") +
  theme_minimal() +
  labs(title = "Top 20 Car Models by Count",
       x = "Model",
       y = "Number of Cars") +
theme(axis.text.x = element_text(angle = 45, hjust = 1, size = 4),
      plot.margin = margin(1, 1, 1, 1, "cm"))+   scale_fill_viridis_d()
```



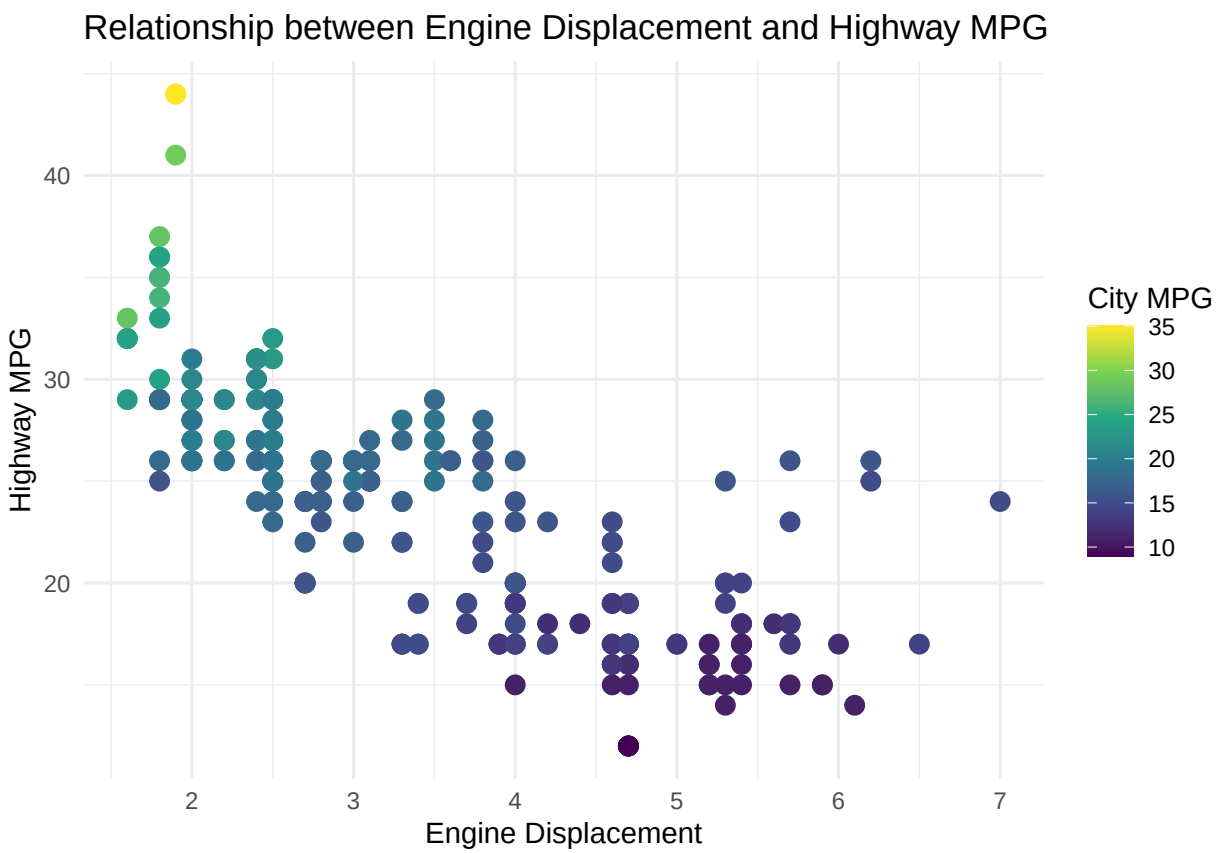

```
# 4b
ggplot(top_20_models, aes(x = model, y = count, fill = model)) +
  geom_bar(stat = "identity", color = "black") +
  coord_flip() +
  theme_minimal() +
  labs(title = "Top 20 Car Models by Count (Flipped)",
       x = "Model",
       y = "Number of Cars") +
  scale_fill_viridis_d()
```




```r
# 5
ggplot(mpg, aes(x = cyl, y = displ, color = displ)) +
  geom_point(size = 3) +
  theme_minimal() +
  labs(title = "Relationship between No. of Cylinders and Engine Displacement",
       x = "Number of Cylinders",
       y = "Engine Displacement") +
  scale_color_viridis_c()
```




```r
# 6
library(ggplot2)

ggplot(mpg, aes(x = displ, y = hwy, color = cty)) +
  geom_point(size = 3) +
  theme_minimal() +
  labs(title = "Relationship between Engine Displacement and Highway MPG",
       x = "Engine Displacement",
       y = "Highway MPG",
       color = "City MPG") +
  scale_color_viridis_c()  # Adds a continuous color scale
```




```
#The plot shows a negative relationship between engine displacement (displ) and highway miles per gallo
```

```
# 6
traffic_data <- read.csv("traffic.csv")

#6 a
num_obs <- nrow(traffic_data)
num_var <- ncol(traffic_data)
var_names <- names(traffic_data)

cat("Number of observations:", num_obs, "\n")
```

```
## Number of observations: 48120
```

```
cat("Number of variables:", num_var, "\n")
```

```
## Number of variables: 4
```

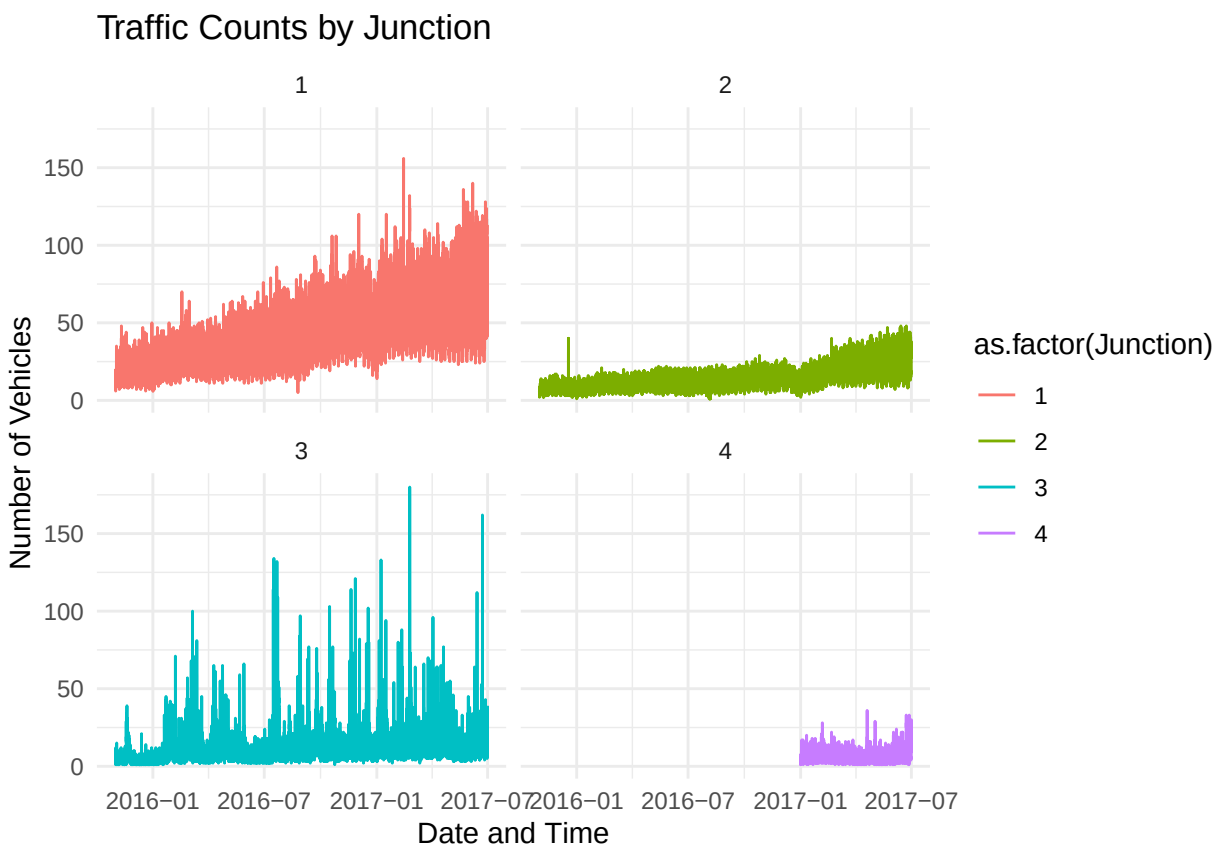
```
cat("Variables:", var_names, "\n")
```

```
## Variables: DateTime Junction Vehicles ID
```

```
# 6b
junction_list <- split(traffic_data, traffic_data$Junction)

for(junction in names(junction_list)) {
  cat("Data for junction:", junction, "\n")
  print(head(junction_list[[junction]]))
  cat("\n")}
```

```
## Data for junction: 1
##              DateTime Junction Vehicles          ID
## 1 2015-11-01 00:00:00        1       15 20151101001
## 2 2015-11-01 01:00:00        1       13 20151101011
## 3 2015-11-01 02:00:00        1       10 20151101021
## 4 2015-11-01 03:00:00        1        7 20151101031
## 5 2015-11-01 04:00:00        1        9 20151101041
## 6 2015-11-01 05:00:00        1        6 20151101051
##
## Data for junction: 2
##                   DateTime Junction Vehicles          ID
## 14593 2015-11-01 00:00:00        2        6 20151101002
## 14594 2015-11-01 01:00:00        2        6 20151101012
## 14595 2015-11-01 02:00:00        2        5 20151101022
## 14596 2015-11-01 03:00:00        2        6 20151101032
## 14597 2015-11-01 04:00:00        2        7 20151101042
## 14598 2015-11-01 05:00:00        2        2 20151101052
##
## Data for junction: 3
##                   DateTime Junction Vehicles          ID
## 29185 2015-11-01 00:00:00        3        9 20151101003
## 29186 2015-11-01 01:00:00        3        7 20151101013
## 29187 2015-11-01 02:00:00        3        5 20151101023
## 29188 2015-11-01 03:00:00        3        1 20151101033
## 29189 2015-11-01 04:00:00        3        2 20151101043
## 29190 2015-11-01 05:00:00        3        2 20151101053
##
## Data for junction: 4
##                   DateTime Junction Vehicles          ID
## 43777 2017-01-01 00:00:00        4        3 20170101004
## 43778 2017-01-01 01:00:00        4        1 20170101014
## 43779 2017-01-01 02:00:00        4        4 20170101024
## 43780 2017-01-01 03:00:00        4        4 20170101034
## 43781 2017-01-01 04:00:00        4        2 20170101044
## 43782 2017-01-01 05:00:00        4        1 20170101054
```

```r
# 6c
library(ggplot2)

traffic_data$DateTime <- as.POSIXct(traffic_data$DateTime, format="%Y-%m-%d %H:%M:%S")

ggplot(traffic_data, aes(x = DateTime, y = Vehicles, color = as.factor(Junction))) +
  geom_line() +
  facet_wrap(~ Junction) +
  labs(title = "Traffic Counts by Junction", x = "Date and Time",
       y = "Number of Vehicles") +
  theme_minimal()
```




```
#7
library(readxl)
alexa_data <- read_excel("alexa_file.xlsx")

# 7a
num_obs <- nrow(alexa_data)
num_cols <- ncol(alexa_data)
col_names <- names(alexa_data)

cat("Number of observations:", num_obs, "\n")
```

```
## Number of observations: 3150
```

```
cat("Number of columns:", num_cols, "\n")
```

```
## Number of columns: 5
```

```
cat("Column names:", col_names, "\n")
```

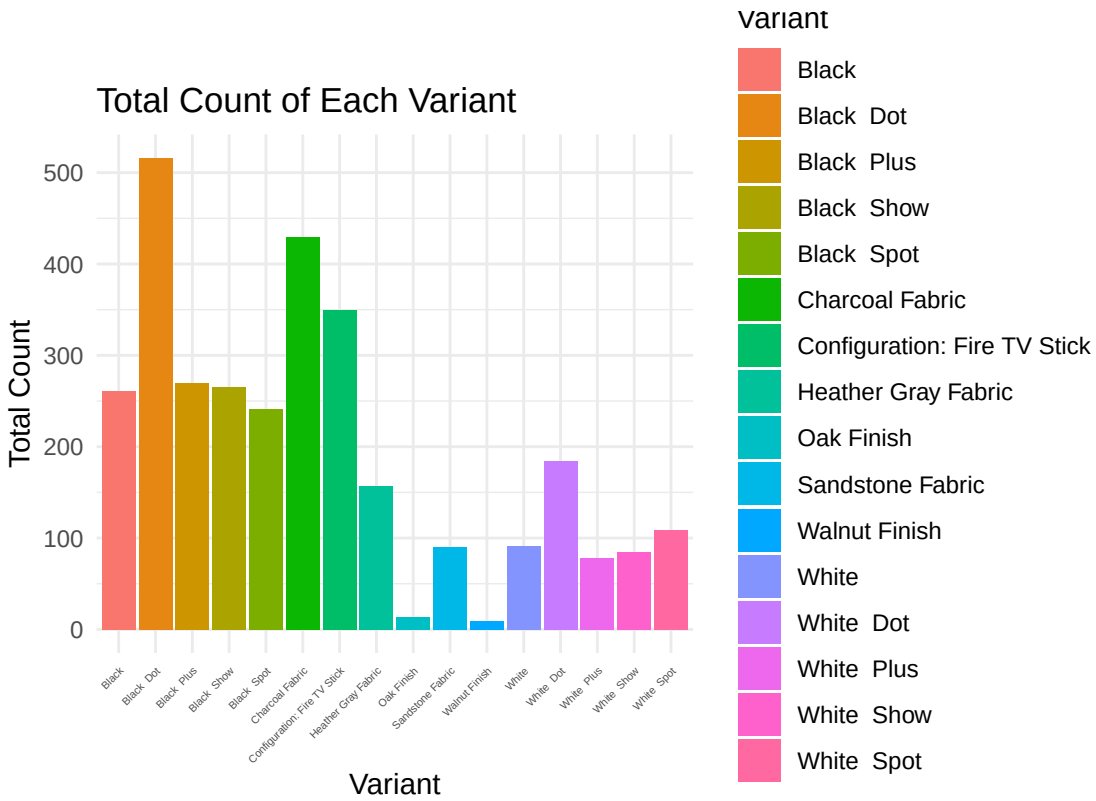
```
## Column names: rating date Variant verified_reviews feedback
```

```
# 7b
library(dplyr)
variation_totals <- alexa_data %>%
  group_by(Variant) %>%
  summarise(total = n())

variation_totals
```

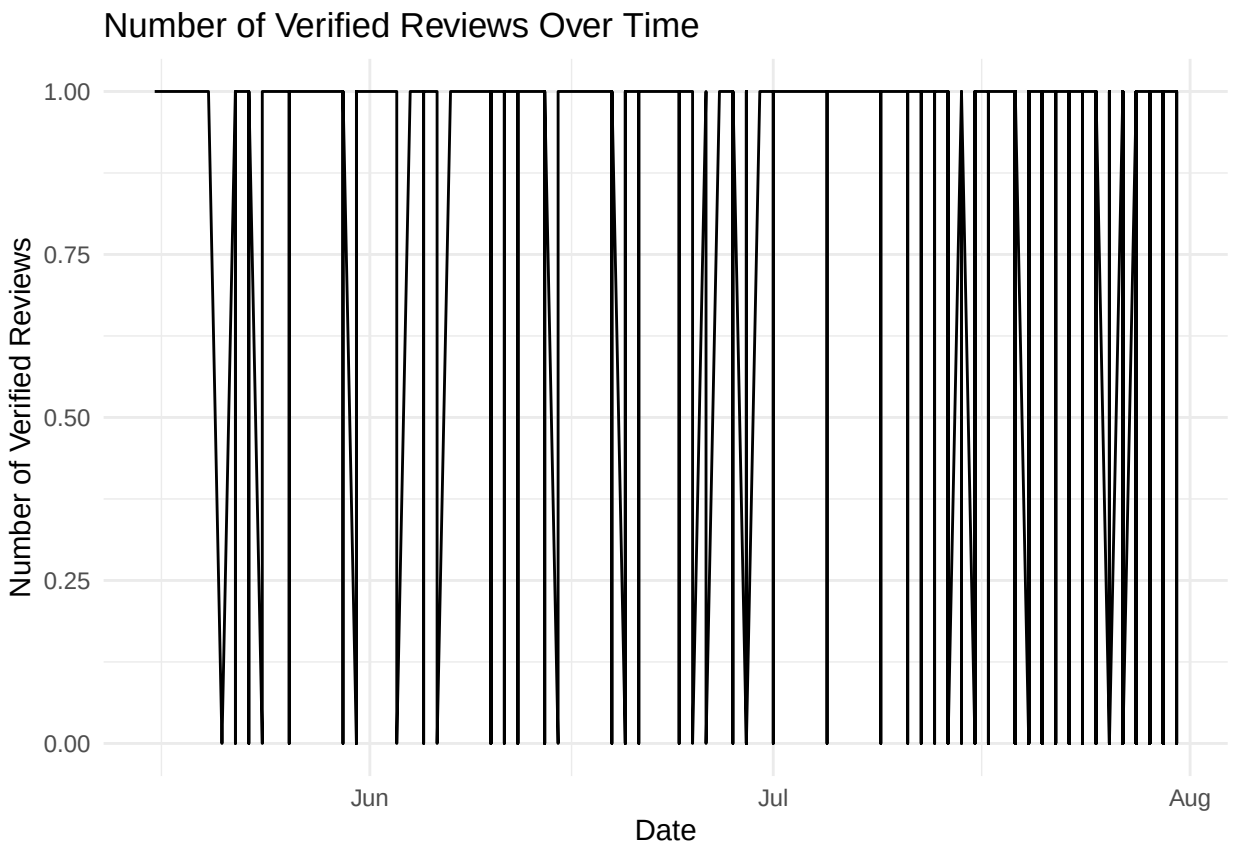
```
## # A tibble: 16 x 2
```

```
##    Variant                       total
##    <chr>                         <int>
##  1 Black                           261
##  2 Black  Dot                      516
##  3 Black  Plus                     270
##  4 Black  Show                     265
##  5 Black  Spot                     241
##  6 Charcoal Fabric                 430
##  7 Configuration: Fire TV Stick    350
##  8 Heather Gray Fabric             157
##  9 Oak Finish                       14
## 10 Sandstone Fabric                 90
## 11 Walnut Finish                     9
## 12 White                            91
## 13 White  Dot                      184
## 14 White  Plus                      78
## 15 White  Show                      85
## 16 White  Spot                     109
```

```r
# 7c
library(ggplot2)

ggplot(variation_totals, aes(x = Variant, y = total, fill = Variant)) +
  geom_bar(stat = "identity") +
  labs(title = "Total Count of Each Variant", x = "Variant",
       y = "Total Count") +
  theme_minimal() +
  theme(axis.text.x = element_text(angle = 45, hjust = 1, size = 4),
        plot.margin = margin(1, 1, 1, 1, "cm"))
```



```r
# 7d
alexa_data$date <- as.Date(alexa_data$date)

ggplot(alexa_data, aes(x = date, y = feedback)) +
  geom_line() +
  labs(title = "Number of Verified Reviews Over Time", x = "Date",
       y = "Number of Verified Reviews") +
  theme_minimal()
```




```r
# 7e
rating_by_variant <- alexa_data %>%
  group_by(Variant) %>%
  summarise(avg_rating = mean(rating, na.rm = TRUE))

rating_by_variant
```

```
## # A tibble: 16 x 2
##    Variant                       avg_rating
##    <chr>                              <dbl>
##  1 Black                               4.23
##  2 Black  Dot                          4.45
##  3 Black  Plus                         4.37
##  4 Black  Show                         4.49
##  5 Black  Spot                         4.31
##  6 Charcoal Fabric                     4.73
##  7 Configuration: Fire TV Stick        4.59
##  8 Heather Gray Fabric                 4.69
```

```
##  9 Oak Finish                        4.86
## 10 Sandstone Fabric                  4.36
## 11 Walnut Finish                     4.89
## 12 White                             4.14
## 13 White  Dot                        4.42
## 14 White  Plus                       4.36
## 15 White  Show                       4.28
## 16 White  Spot                       4.31
```

```r
ggplot(rating_by_variant, aes(x = Variant, y = avg_rating, fill = Variant)) +
  geom_bar(stat = "identity") +
  labs(title = "Average Rating by Variant", x = "Variant", y = "Average Rating") +
  theme_minimal() +
  theme(axis.text.x = element_text(angle = 45, hjust = 1, size = 4),
        plot.margin = margin(1, 1, 1, 1, "cm"))
```