Statistics and Data Analysis Assignment

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09/04/2021

Roller Coaster Dataset Analysis

State hypothesis here...

Basic analysis and plots

```
roller_coasters_raw <- readr::read_csv('datasets/roller_coasters.csv')
```

```
##
## -- Column specification --------------------------------------------------------
## cols(
##   Name = col_character(),
##   Park = col_character(),
##   City = col_character(),
##   State = col_character(),
##   Country = col_character(),
##   Type = col_character(),
##   Construction = col_character(),
##   Height = col_double(),
##   Speed = col_double(),
##   Length = col_double(),
##   Inversions = col_character(),
##   Numinversions = col_double(),
##   Duration = col_double(),
##   GForce = col_double(),
##   Opened = col_double(),
##   Region = col_character()
## )
```

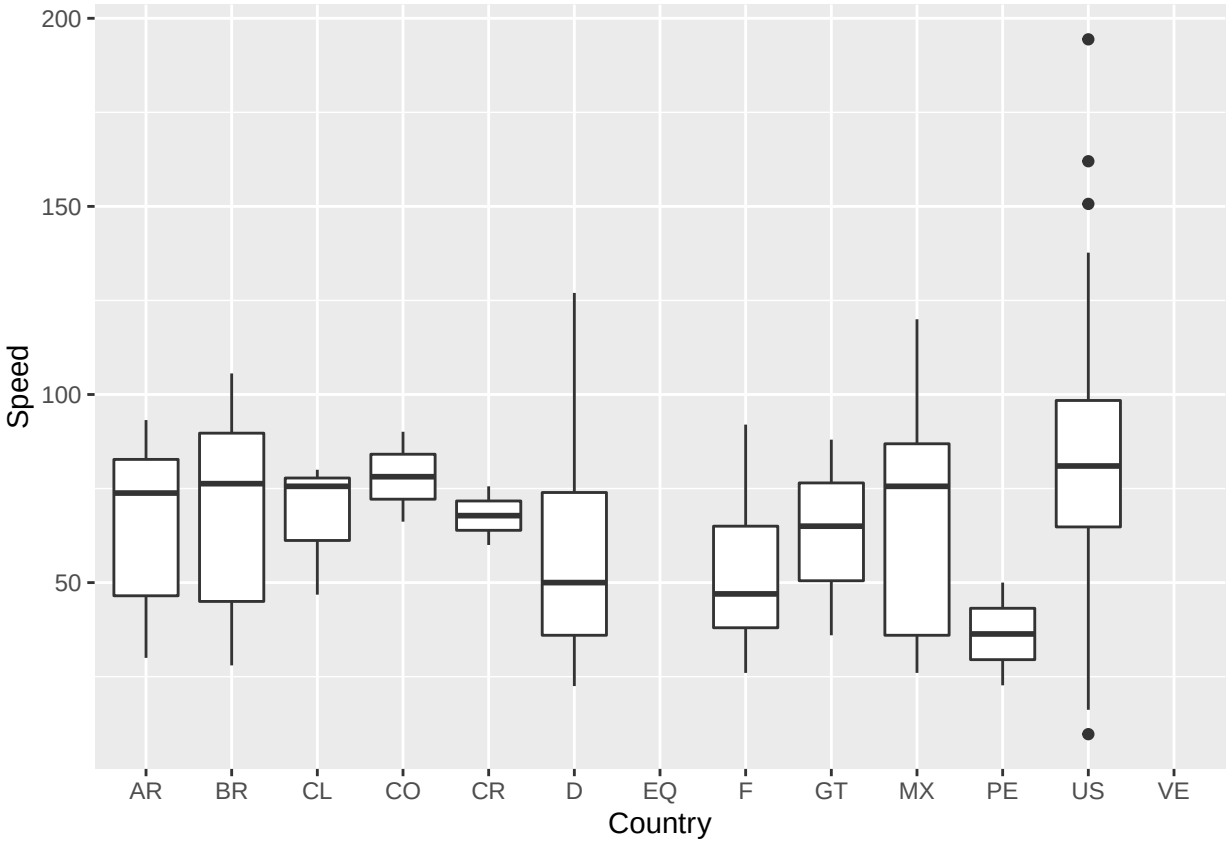
```
# GForce to many missing values..
#
summary(roller_coasters_raw)
```

```
##      Name               Park               City              State
##  Length:408         Length:408         Length:408         Length:408
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
```

```
##
##
##
##    Country              Type           Construction          Height
##  Length:408         Length:408         Length:408         Min.   :  2.438
##  Class :character   Class :character   Class :character   1st Qu.:  8.651
##  Mode  :character   Mode  :character   Mode  :character   Median : 18.288
##                                                           Mean   : 23.125
##                                                           3rd Qu.: 33.167
##                                                           Max.   :128.016
##                                                           NA's   :82
##      Speed            Length         Inversions        Numinversions
##  Min.   :  9.72   Min.   :  12.19   Length:408         Min.   : 0.0000
##  1st Qu.: 45.00   1st Qu.: 291.00   Class :character   1st Qu.: 0.0000
##  Median : 68.85   Median : 415.75   Mode  :character   Median : 0.0000
##  Mean   : 69.36   Mean   : 597.04                      Mean   : 0.7843
##  3rd Qu.: 88.95   3rd Qu.: 833.12                      3rd Qu.: 0.0000
##  Max.   :194.40   Max.   :2243.02                      Max.   :10.0000
##  NA's   :138      NA's   :90
##     Duration         GForce          Opened        Region
##  Min.   :  0.3   Min.   :2.100   Min.   :1924   Length:408
##  1st Qu.: 75.0   1st Qu.:3.175   1st Qu.:1991   Class :character
##  Median :108.0   Median :4.500   Median :1999   Mode  :character
##  Mean   :112.5   Mean   :4.115   Mean   :1995
##  3rd Qu.:140.8   3rd Qu.:5.000   3rd Qu.:2004
##  Max.   :300.0   Max.   :6.200   Max.   :2014
##  NA's   :216     NA's   :348     NA's   :28
```

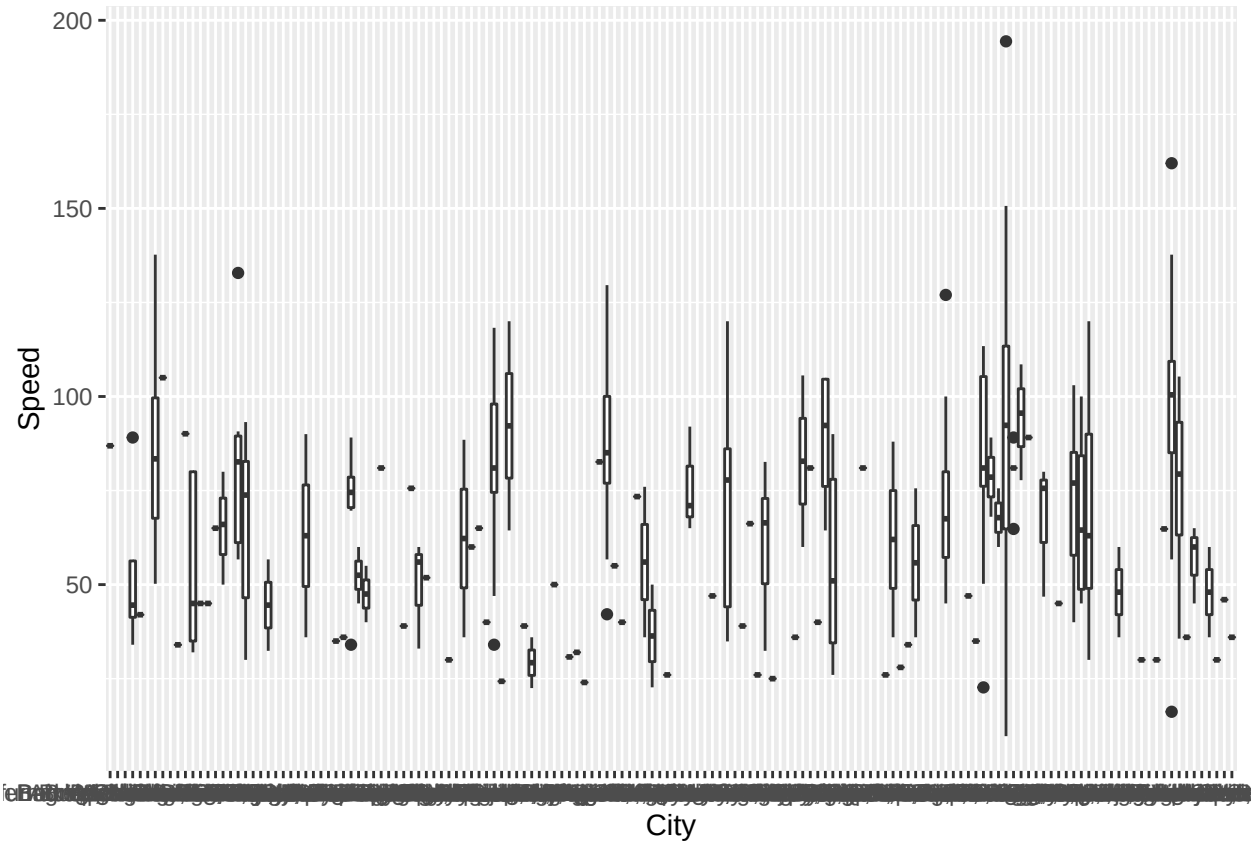
```
ggplot(data = roller_coasters_raw) +
  geom_boxplot(mapping = aes(x = Country, y = Speed))
```

```
## Warning: Removed 138 rows containing non-finite values (stat_boxplot).
```



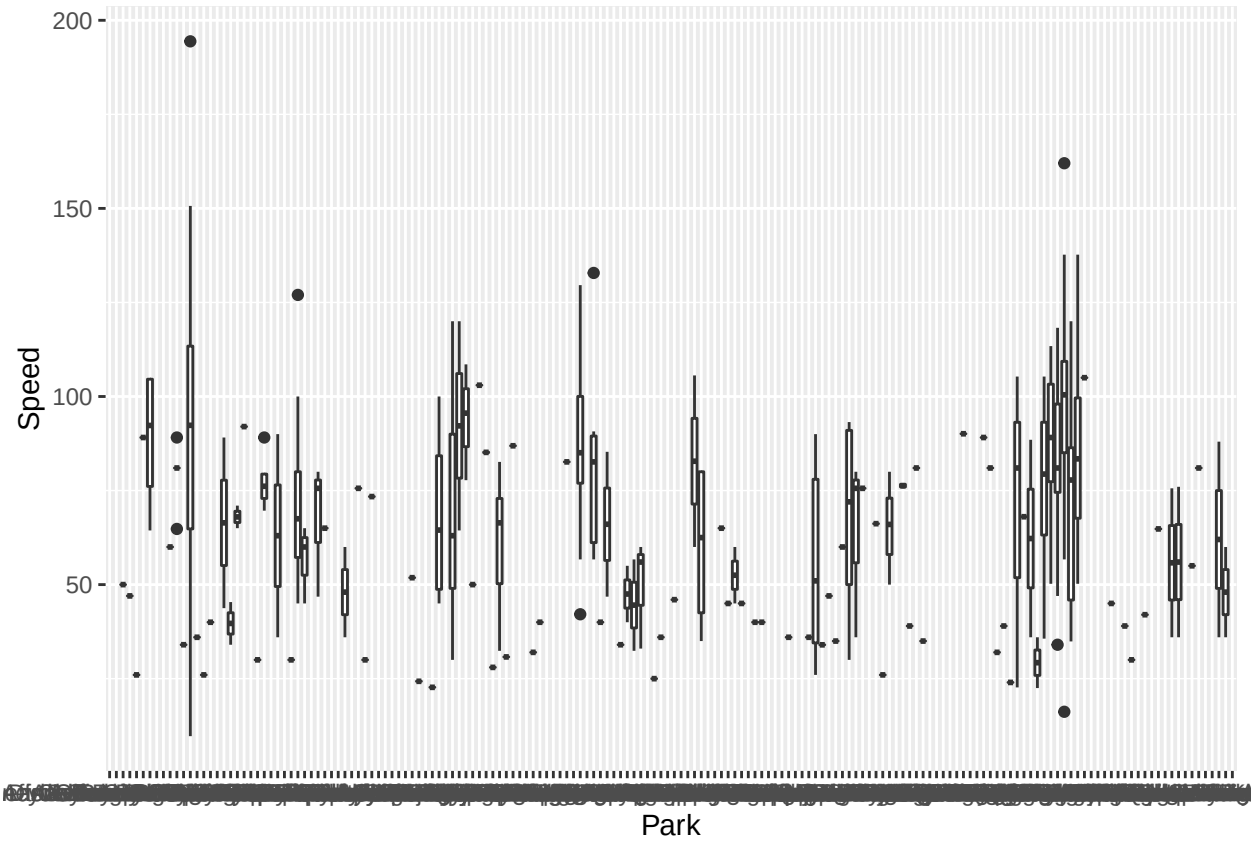

```
ggplot(data = roller_coasters_raw) +
  geom_boxplot(mapping = aes(x = City, y = Speed))
```

```
## Warning: Removed 138 rows containing non-finite values (stat_boxplot).
```



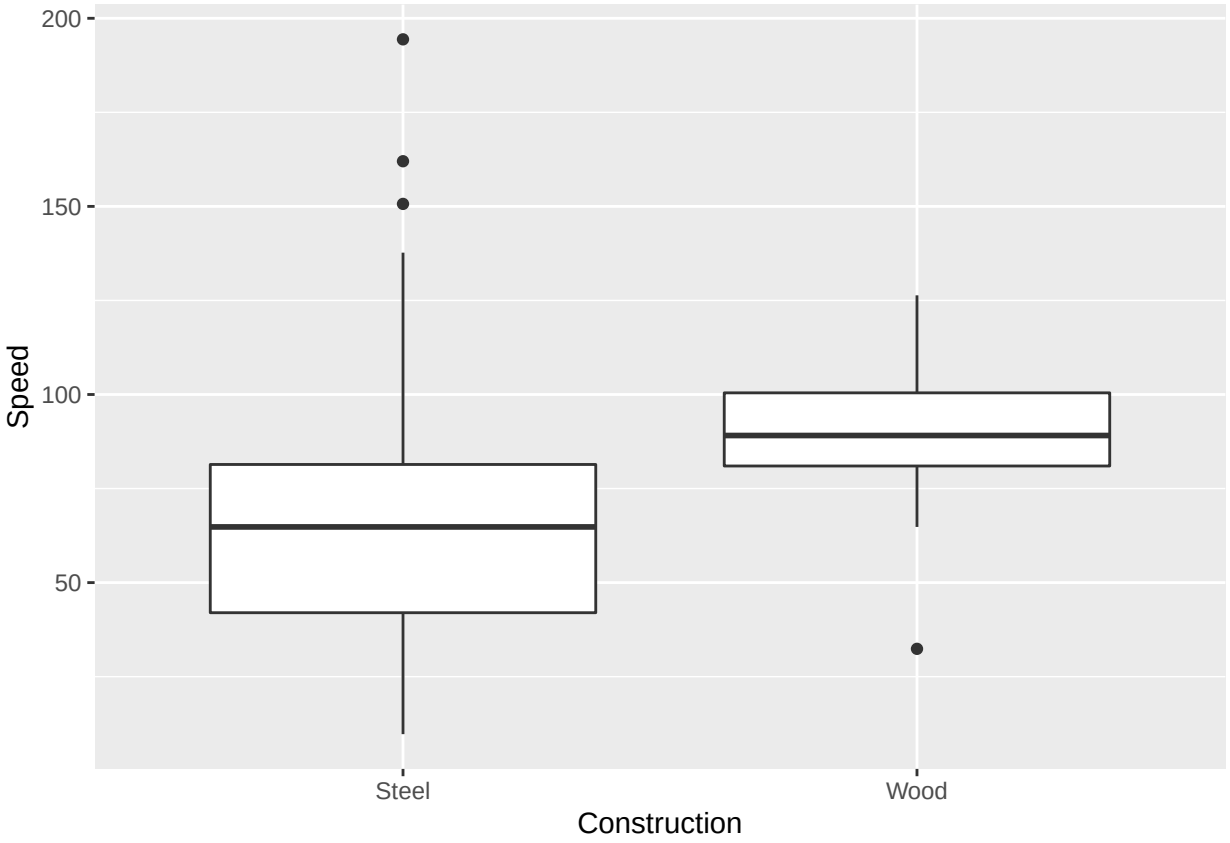

```
ggplot(data = roller_coasters_raw) +
  geom_boxplot(mapping = aes(x = Park, y = Speed))
```

```
## Warning: Removed 138 rows containing non-finite values (stat_boxplot).
```



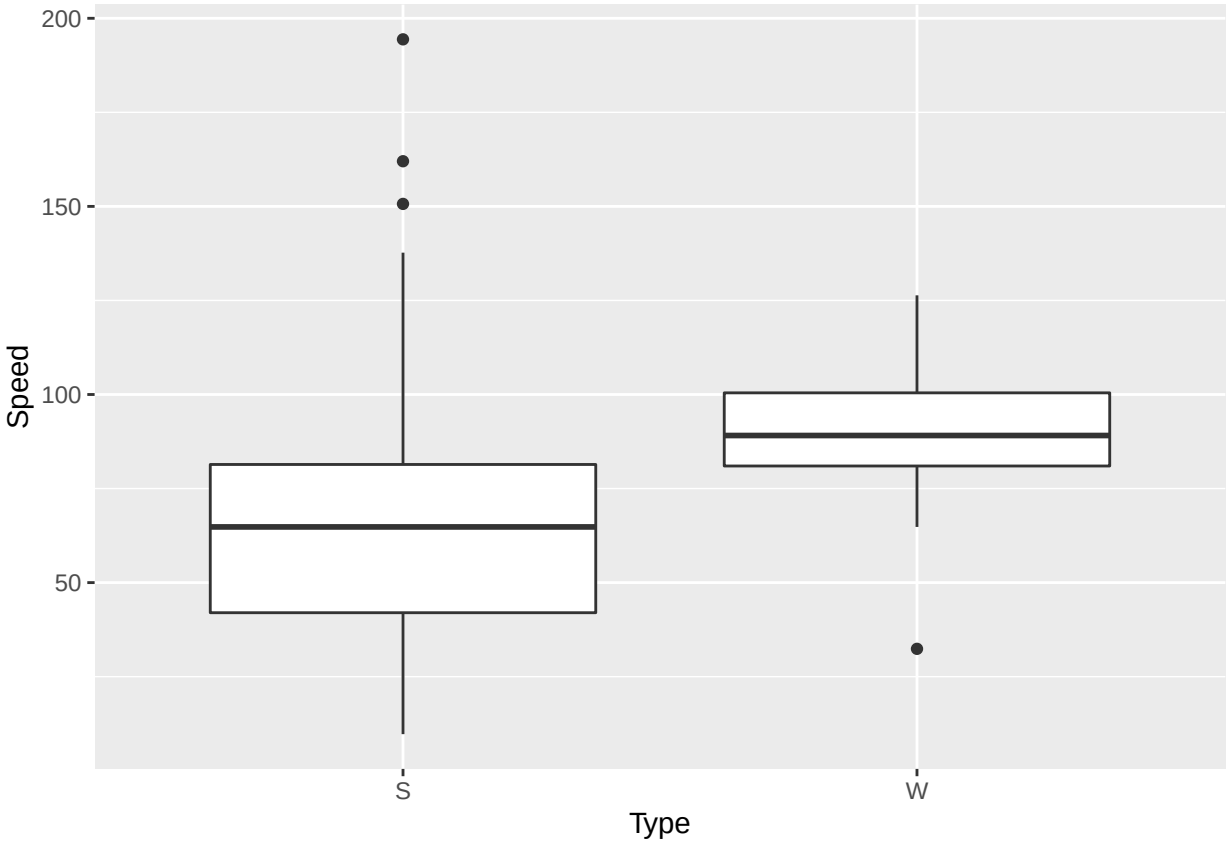

```
ggplot(data = roller_coasters_raw) +
  geom_boxplot(mapping = aes(x = Construction, y = Speed))
```

```
## Warning: Removed 138 rows containing non-finite values (stat_boxplot).
```



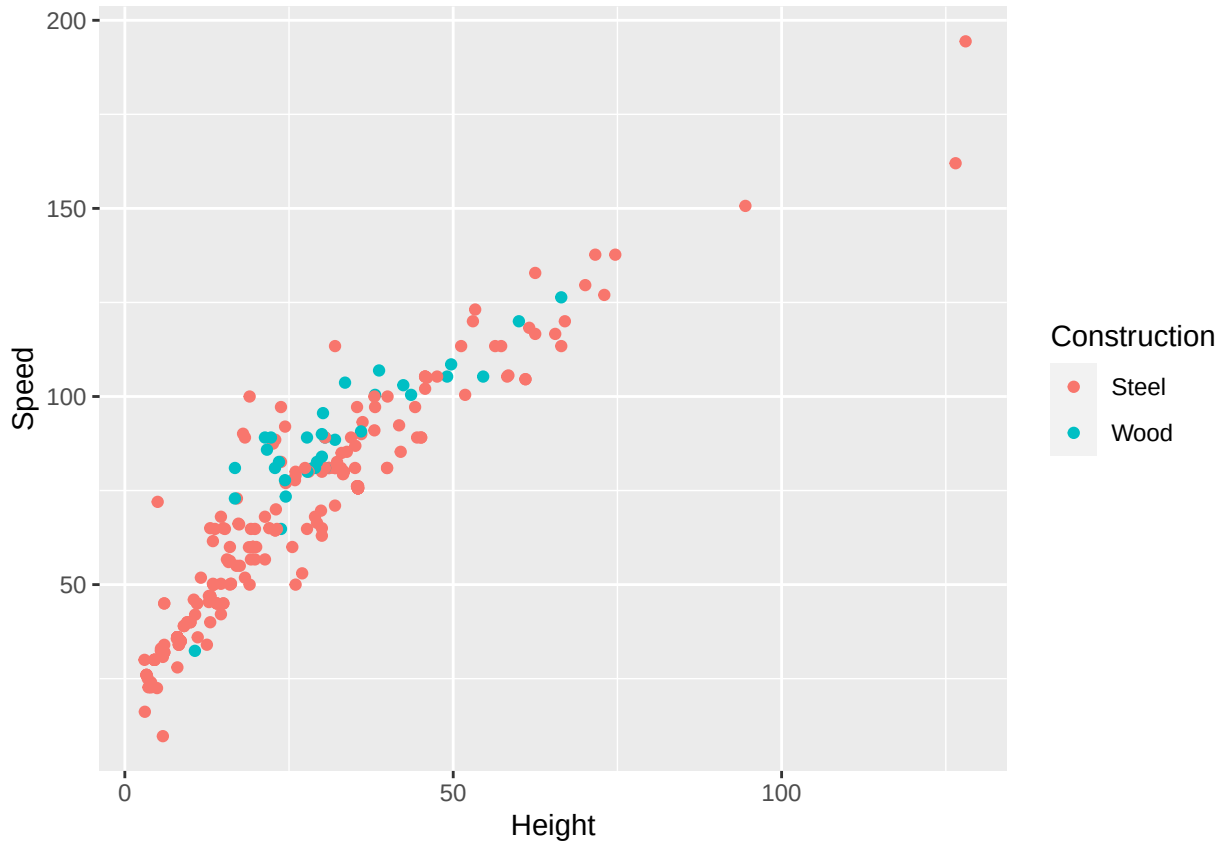

```
# Type is same as Construction?
ggplot(data = roller_coasters_raw) +
  geom_boxplot(mapping = aes(x = Type, y = Speed))
```

```
## Warning: Removed 138 rows containing non-finite values (stat_boxplot).
```



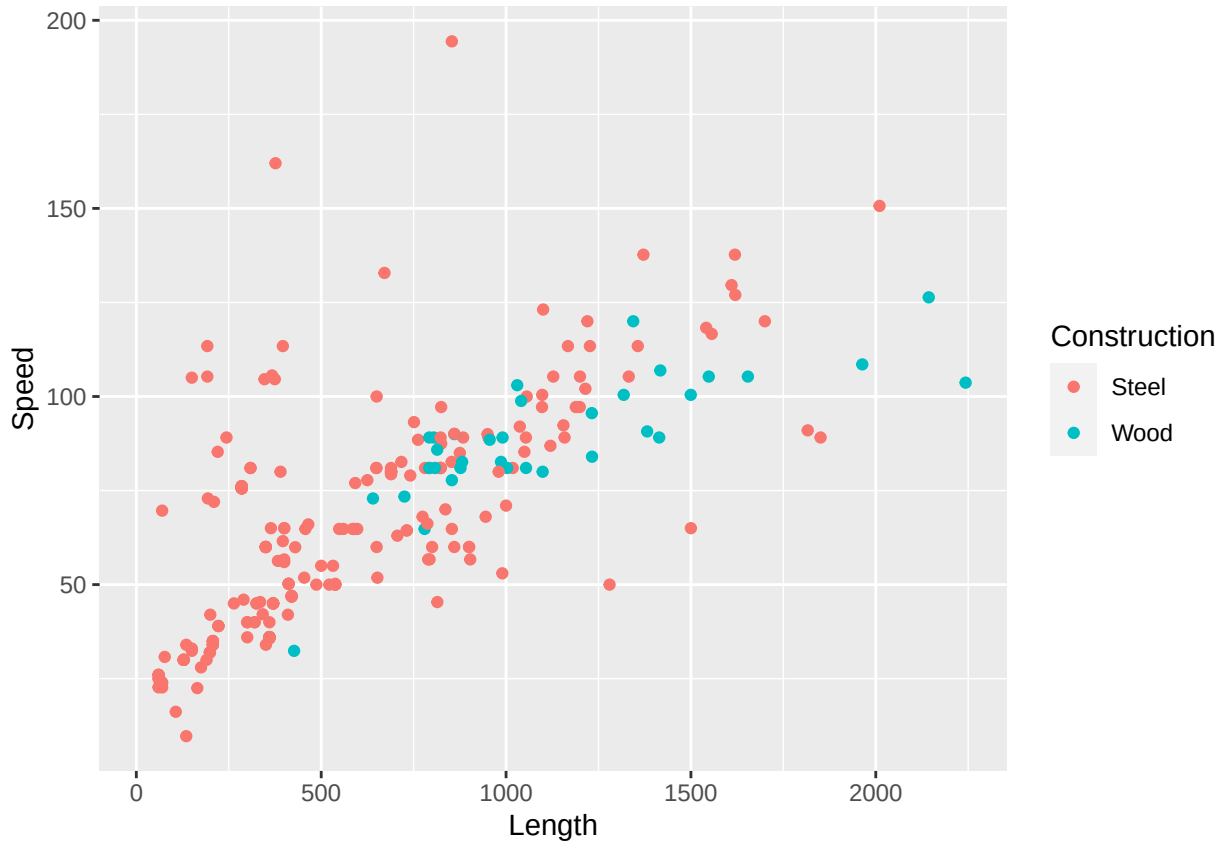

```
roller_coasters_raw %>%
  ggplot() +
    geom_point(aes(x = Height, y = Speed, color = Construction))
```

```
## Warning: Removed 150 rows containing missing values (geom_point).
```



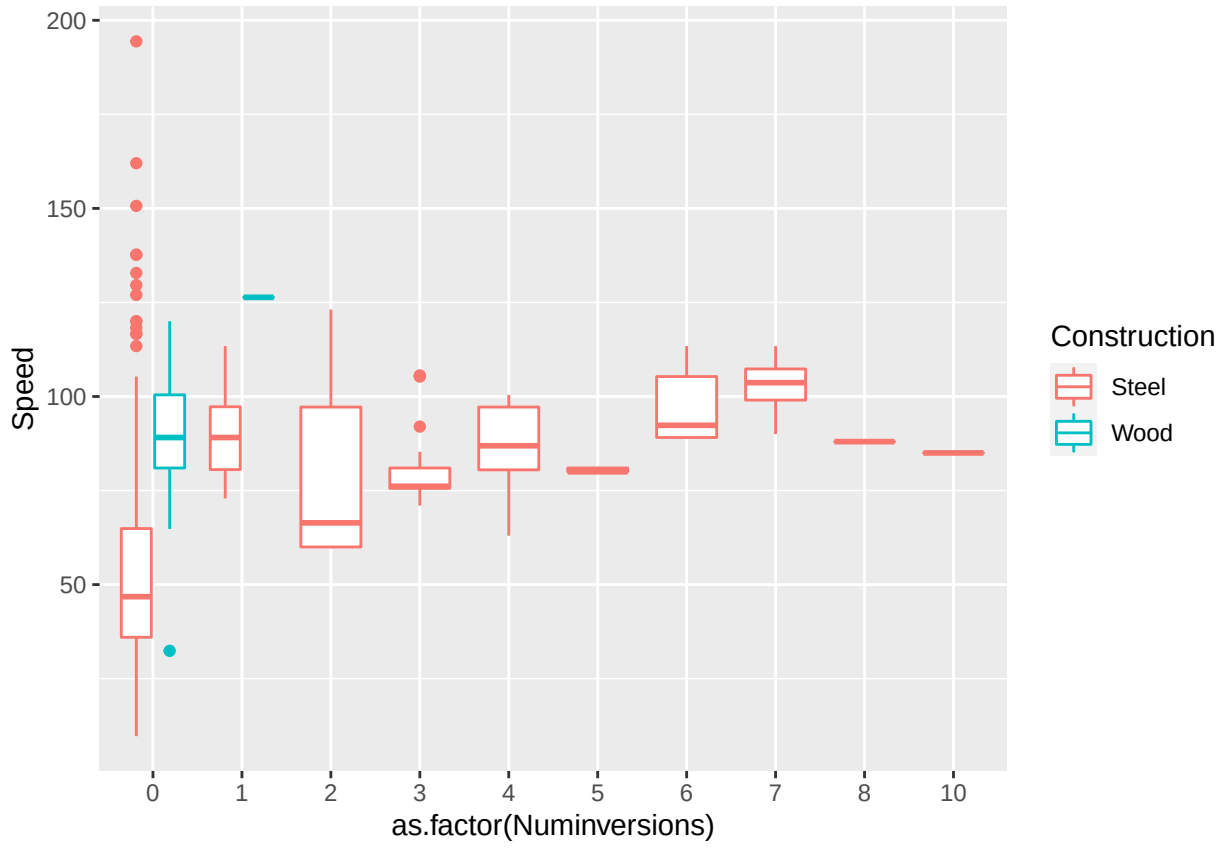

```
roller_coasters_raw %>%
  ggplot() +
    geom_point(aes(x = Length, y = Speed, color = Construction))
```

```
## Warning: Removed 148 rows containing missing values (geom_point).
```



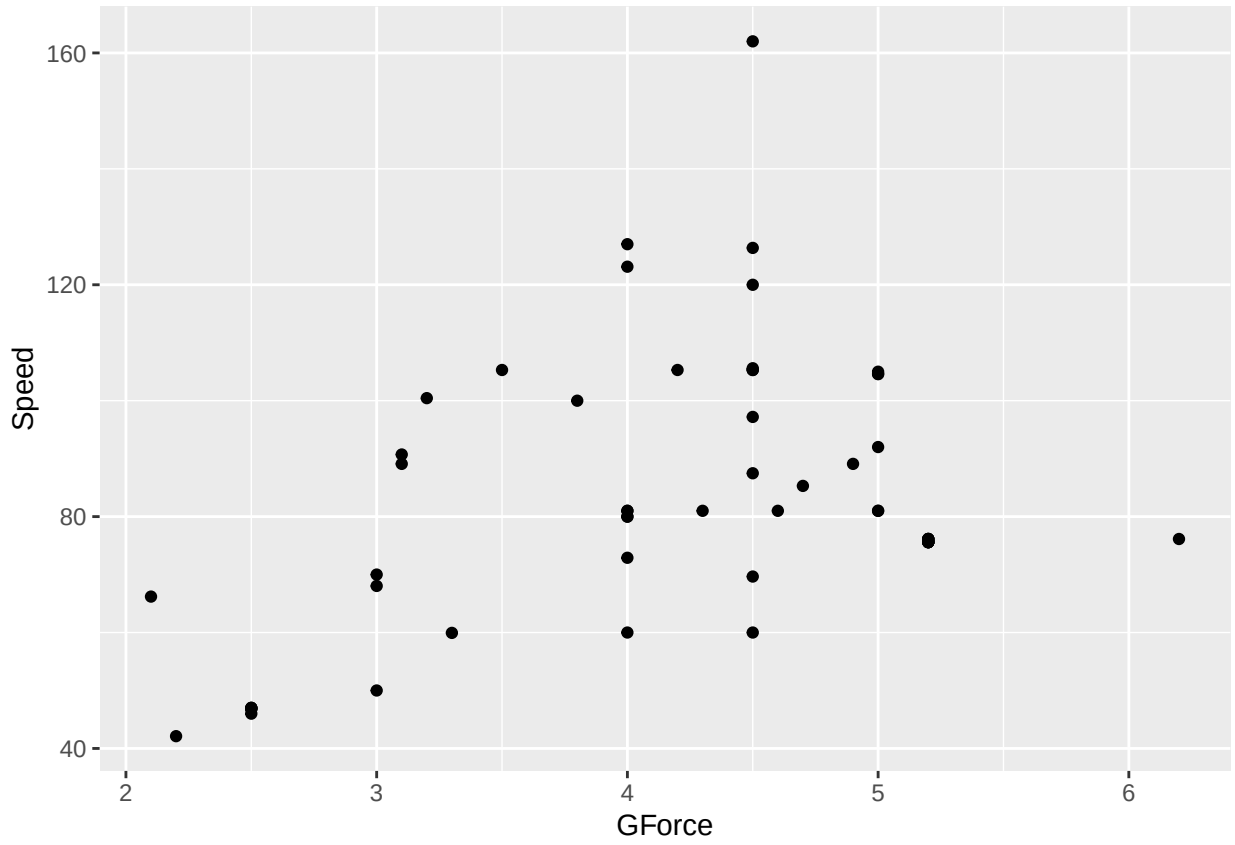

```
roller_coasters_raw %>%
  ggplot() +
    geom_boxplot(aes(x = as.factor(Numinversions), y = Speed, color = Construction))
```

```
## Warning: Removed 138 rows containing non-finite values (stat_boxplot).
```




```
# dost lame ... lahko spustimo
roller_coasters_raw %>%
  filter(!is.na(GForce)) %>%
  ggplot() +
    geom_point(aes(x = GForce, y = Speed))
```

```
## Warning: Removed 2 rows containing missing values (geom_point).
```



Inference?

Correlation Analysis

```
# precej zanimivi so Height, Length, Numinversions
(cor.test(roller_coasters_raw$Height, roller_coasters_raw$Speed))
```

```
##
##  Pearson's product-moment correlation
##
## data:  roller_coasters_raw$Height and roller_coasters_raw$Speed
## t = 38.222, df = 256, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.9019179 0.9388051
## sample estimates:
##       cor
## 0.9224392
```

```
(cor.test(roller_coasters_raw$Length, roller_coasters_raw$Speed))
```

```
##
```

```
##  Pearson's product-moment correlation
##
## data:  roller_coasters_raw$Length and roller_coasters_raw$Speed
## t = 15.582, df = 258, p-value < 2.2e-16
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.6278199 0.7540719
## sample estimates:
##       cor
## 0.6962931
```

```
(cor.test(roller_coasters_raw$Numinversions, roller_coasters_raw$Speed))
```

```
##
##  Pearson's product-moment correlation
##
## data:  roller_coasters_raw$Numinversions and roller_coasters_raw$Speed
## t = 5.5742, df = 268, p-value = 6.061e-08
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.2110692 0.4253337
## sample estimates:
##       cor
## 0.3223236
```

```
(cor.test(roller_coasters_raw$Duration, roller_coasters_raw$Speed))
```

```
##
##  Pearson's product-moment correlation
##
## data:  roller_coasters_raw$Duration and roller_coasters_raw$Speed
## t = 3.9954, df = 162, p-value = 9.781e-05
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.1532868 0.4328823
## sample estimates:
##       cor
## 0.2995011
```

```
(cor.test(roller_coasters_raw$GForce, roller_coasters_raw$Speed))
```

```
##
##  Pearson's product-moment correlation
##
## data:  roller_coasters_raw$GForce and roller_coasters_raw$Speed
## t = 3.3676, df = 56, p-value = 0.001377
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  0.1701111 0.6045861
## sample estimates:
##       cor
## 0.4103754
```

```
(cor.test(roller_coasters_raw$Opened, roller_coasters_raw$Speed)) # shit
```

```
##
##  Pearson's product-moment correlation
##
## data:  roller_coasters_raw$Opened and roller_coasters_raw$Speed
## t = 0.26238, df = 260, p-value = 0.7932
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.1051251  0.1371870
## sample estimates:
##        cor
## 0.01626982
```

Regression

```
roller_coasters <- roller_coasters_raw %>%
  select(Construction, Length, Height, Speed) %>%
  filter(!is.na(Speed) & !is.na(Height) & !is.na(Length)) %>%
  mutate("Steel" = as.numeric(Construction == 'Steel')) %>%
  select(-Construction)
roller_coasters
```

```
## # A tibble: 252 x 4
##    Length Height Speed Steel
##     <dbl>  <dbl> <dbl> <dbl>
##  1   853.  128.   194.     1
##  2   376.  126.   162      1
##  3  2010.   94.5  151.     1
##  4  1619.   74.7  138.     1
##  5  1620    73    127      1
##  6  1372.   71.6  138.     1
##  7  1610.   70.1  130.     1
##  8  1700    67    120      1
##  9  2143.   66.4  126.     0
## 10   396.   66.4  113.     1
## # ... with 242 more rows
```

```
## 75% of the sample size
smp_size <- floor(0.75 * nrow(roller_coasters))

## set the seed to make your partition reproducible
set.seed(123)
train_ind <- sample(seq_len(nrow(roller_coasters)), size = smp_size)

(train <- roller_coasters[train_ind, ])
```

```
## # A tibble: 189 x 4
##    Length Height Speed Steel
##     <dbl>  <dbl> <dbl> <dbl>
```

```
##  1   412.   16.2  50.2     1
##  2   207     8.5  34.9     1
##  3   538.   13.4  50.2     1
##  4   375.   61   105.      1
##  5   427.   10.7  32.4     0
##  6   774.   14.6  68.0     1
##  7   950    36    90       1
##  8   717.   23.8  82.6     1
##  9   309.   39.9  81       1
## 10   264     6    45       1
## # ... with 179 more rows
```

```
(test <- roller_coasters[-train_ind, ])
```

```
## # A tibble: 63 x 4
##    Length Height Speed Steel
##     <dbl>  <dbl> <dbl> <dbl>
##  1   376.  126.   162      1
##  2  2010.   94.5  151.     1
##  3   671.   62.5  133.     1
##  4   347.   61    105.     1
##  5   367.   58.2  105.     1
##  6  1167.   57.3  113.     1
##  7  1654.   49.1  105.     0
##  8  1332.   47.5  105.     1
##  9   150    46    105      1
## 10   192.   45.7  105.     1
## # ... with 53 more rows
```

```
lin_model <- lm(Speed ~ ., data = train)
(summary(lin_model))
```

```
##
## Call:
## lm(formula = Speed ~ ., data = train)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -21.388  -6.020  -0.644   4.466  35.365
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 33.376471   2.513555  13.279  < 2e-16 ***
## Length       0.013174   0.002178   6.047 7.97e-09 ***
## Height       1.248969   0.047545  26.269  < 2e-16 ***
## Steel       -5.752860   2.109654  -2.727  0.00701 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8.749 on 185 degrees of freedom
## Multiple R-squared:  0.9103, Adjusted R-squared:  0.9088
## F-statistic: 625.7 on 3 and 185 DF,  p-value: < 2.2e-16
```

```
(coef(lin_model))
```

```
## (Intercept)      Length      Height       Steel
## 33.37647051  0.01317372  1.24896948 -5.75286049
```

Steam store games dataset analysis

For our second dataset...

```
steam <- read.csv("datasets/steam.csv")
```

Description

Summary statistics

Inference