SA2_OIL

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library(ez) library(car) ## R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
library(tidyverse)
```

```
## Warning: package 'tidyverse' was built under R version 4.2.3

## Warning: package 'ggplot2' was built under R version 4.2.3

## Warning: package 'tibble' was built under R version 4.2.3

## Warning: package 'tidyr' was built under R version 4.2.3

## Warning: package 'readr' was built under R version 4.2.3

## Warning: package 'purrr' was built under R version 4.2.3

## Warning: package 'dplyr' was built under R version 4.2.3

## Warning: package 'stringr' was built under R version 4.2.3

## Warning: package 'forcats' was built under R version 4.2.3

## Warning: package 'lubridate' was built under R version 4.2.3

## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.3     v readr     2.1.4
## v forcats   1.0.0     v stringr   1.5.0
## v ggplot2   3.4.3     v tibble    3.2.1
## v lubridate 1.9.3     v tidyr     1.3.0
## 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
```

```r
library(rstatix)
```

```
##
## Attaching package: 'rstatix'
##
## The following object is masked from 'package:stats':
##
##     filter
```

```r
library(car)
```

```
## Warning: package 'car' was built under R version 4.2.3
```

```
## Loading required package: carData
##
## Attaching package: 'car'
##
## The following object is masked from 'package:dplyr':
##
##     recode
##
## The following object is masked from 'package:purrr':
##
##     some
```

```r
library(ggplot2)
library(lme4)
```

```
## Warning: package 'lme4' was built under R version 4.2.3
```

```
## Loading required package: Matrix
```

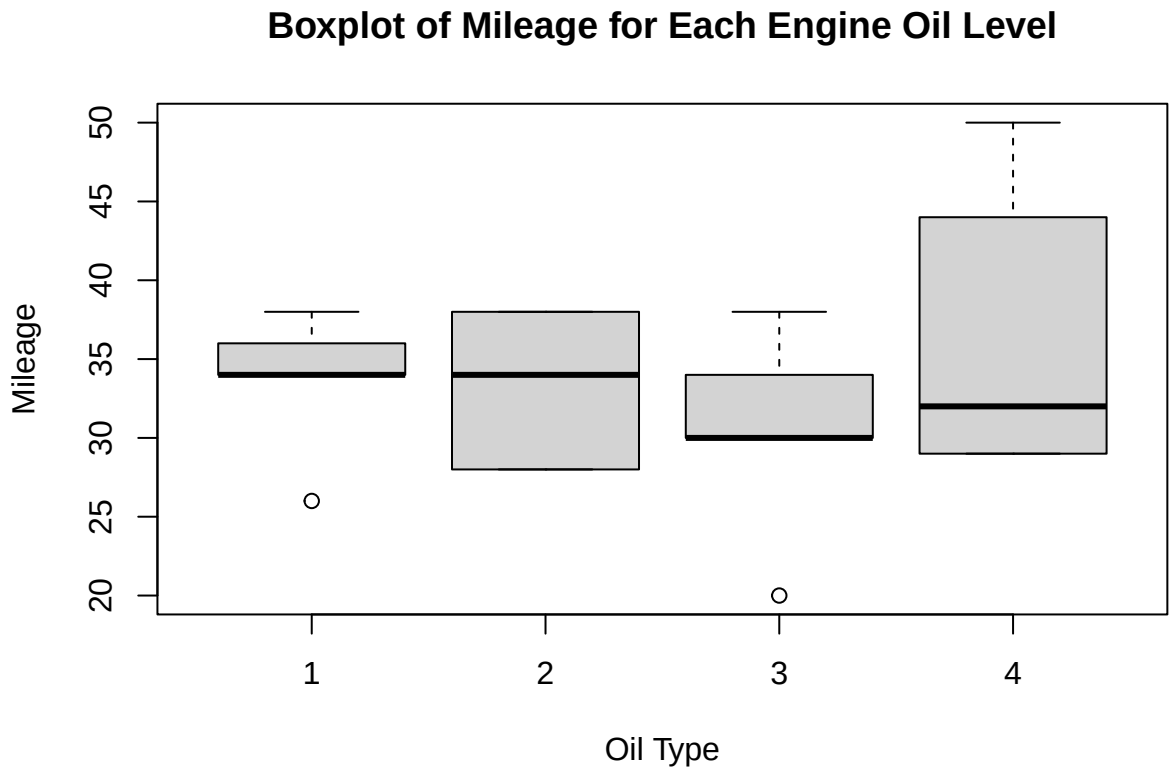
```
## Warning: package 'Matrix' was built under R version 4.2.3
```

```
##
## Attaching package: 'Matrix'
##
## The following objects are masked from 'package:tidyr':
##
##     expand, pack, unpack
```

```r
library(ez)
# Load the data of the study
dataframe <- data.frame('Cars' = rep(1:5, each = 4),
                        'Oil' = rep(1:4, times = 5),
                        'Mileage' = c(36, 38, 30, 29,
                                      34, 38, 30, 29,
                                      34, 28, 38, 32,
                                      38, 34, 20, 44,
                                      26, 28, 34, 50))
```

```r
dataframe$Oil <- as.factor(dataframe$Oil)


# Boxplot before adding outliers
boxplot(Mileage ~ Oil, data = dataframe, main = "Boxplot of Mileage for Each Engine Oil Level", xlab =
```




```r
# Perform Shapiro-Wilk Test
shapiro_test <- dataframe %>%
  group_by(Oil) %>%
  summarise(p_value = shapiro.test(Mileage)$p.value)
print(shapiro_test)
```

```
## # A tibble: 4 x 2
##   Oil   p_value
##   <fct>   <dbl>
## 1 1       0.228
## 2 2       0.105
## 3 3       0.616
## 4 4       0.147
```

```r
# Perform repeated measures ANOVA using ezANOVA
anova_result <- ezANOVA(
  data = dataframe,
  dv = Mileage,
```

```
  wid = Cars,
  within = Oil,
  detailed = TRUE
)
```

```
## Warning: Converting "Cars" to factor for ANOVA.
```

```
# Print the ANOVA results
print(anova_result)
```

```
## $ANOVA
##        Effect DFn DFd   SSn   SSd            F            p p<.05       ges
## 1 (Intercept)   1   4 22445   8.5 1.056235e+04 5.374720e-08     * 0.9683334
## 2         Oil   3  12   103 725.5 5.678842e-01 6.466468e-01       0.1230585
##
## $`Mauchly's Test for Sphericity`
##   Effect         W        p p<.05
## 2    Oil 0.2874098 0.658963
##
## $`Sphericity Corrections`
##   Effect       GGe     p[GG] p[GG]<.05      HFe     p[HF] p[HF]<.05
## 2    Oil 0.6876969 0.5924143           1.431052 0.6466468
```