P2.2

Lara

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```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.2     v readr     2.1.4
## v forcats   1.0.0     v stringr   1.5.0
## v ggplot2   3.4.2     v tibble    3.2.1
## v lubridate 1.9.2     v tidyr     1.3.0
## v purrr     1.0.1
## -- 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(tidyr)
library(dplyr)
library(ggplot2)
library(readxl)
library(magrittr)
```

```
##
## Attaching package: 'magrittr'
##
## The following object is masked from 'package:purrr':
##
##     set_names
##
## The following object is masked from 'package:tidyr':
##
##     extract
```

```
library(readr)
library(knitr)
```

EXPERIMENTO 1

Importando os dados:

```
exp1<- read_xlsx("helicopter.xlsx")
str(exp1)
```

```
## tibble [20 x 5] (S3: tbl_df/tbl/data.frame)
##  $ Dia        : num [1:20] 1 1 1 1 1 1 1 1 1 1 ...
```

```
##  $ Horario    : chr [1:20] "13:40 - 13:50" "13:40 - 13:50" "13:40 - 13:50" "13:40 - 13:50" ...
##  $ Helicoptero: chr [1:20] "Vermelho" "Vermelho" "Vermelho" "Vermelho" ...
##  $ Tlara      : num [1:20] 5.76 5.01 3.93 4.6 4.3 4.48 4.95 5.29 5.1 4.28 ...
##  $ Tmariana   : num [1:20] 4.8 5.21 3.88 4.33 4.6 6.5 6.2 5.3 4.85 4.19 ...
```

```
exp1 <- as.data.frame(exp1)
str(exp1)
```

```
## 'data.frame':    20 obs. of  5 variables:
##  $ Dia        : num  1 1 1 1 1 1 1 1 1 1 ...
##  $ Horario    : chr  "13:40 - 13:50" "13:40 - 13:50" "13:40 - 13:50" "13:40 - 13:50" ...
##  $ Helicoptero: chr  "Vermelho" "Vermelho" "Vermelho" "Vermelho" ...
##  $ Tlara      : num  5.76 5.01 3.93 4.6 4.3 4.48 4.95 5.29 5.1 4.28 ...
##  $ Tmariana   : num  4.8 5.21 3.88 4.33 4.6 6.5 6.2 5.3 4.85 4.19 ...
```

```
head(exp1)
```

```
##   Dia       Horario Helicoptero Tlara Tmariana
## 1   1 13:40 - 13:50    Vermelho  5.76     4.80
## 2   1 13:40 - 13:50    Vermelho  5.01     5.21
## 3   1 13:40 - 13:50    Vermelho  3.93     3.88
## 4   1 13:40 - 13:50    Vermelho  4.60     4.33
## 5   1 13:40 - 13:50    Vermelho  4.30     4.60
## 6   1 13:40 - 13:50    Vermelho  4.48     6.50
```

Descritiva/Exploratoria

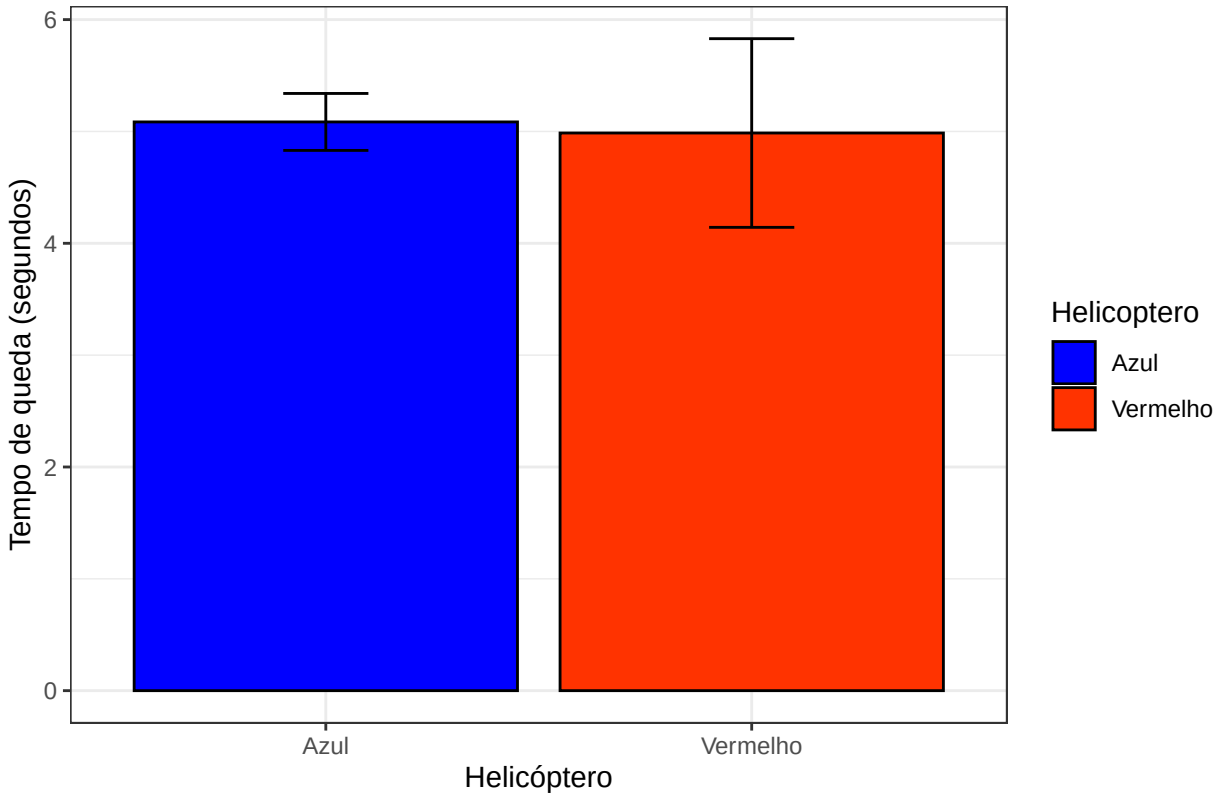
```
medidas.resumo <- exp1 %>% select(c(Helicoptero, Tmariana)) %>% group_by(Helicoptero) %>% summarise(Medi
                                                                                                    Medi
                                                                                                    SD =
                                                                                                    Min
                                                                                                    Max=
                                                                                                    Coef


kable(medidas.resumo, digits = 1, caption = "Tabela")
```

Table 1: Tabela

Helicoptero	Mediana	Media	SD	Min	Max	Coef.var
Azul	5.1	5.1	0.3	4.7	5.5	5.0
Vermelho	4.8	5.0	0.8	3.9	6.5	16.9

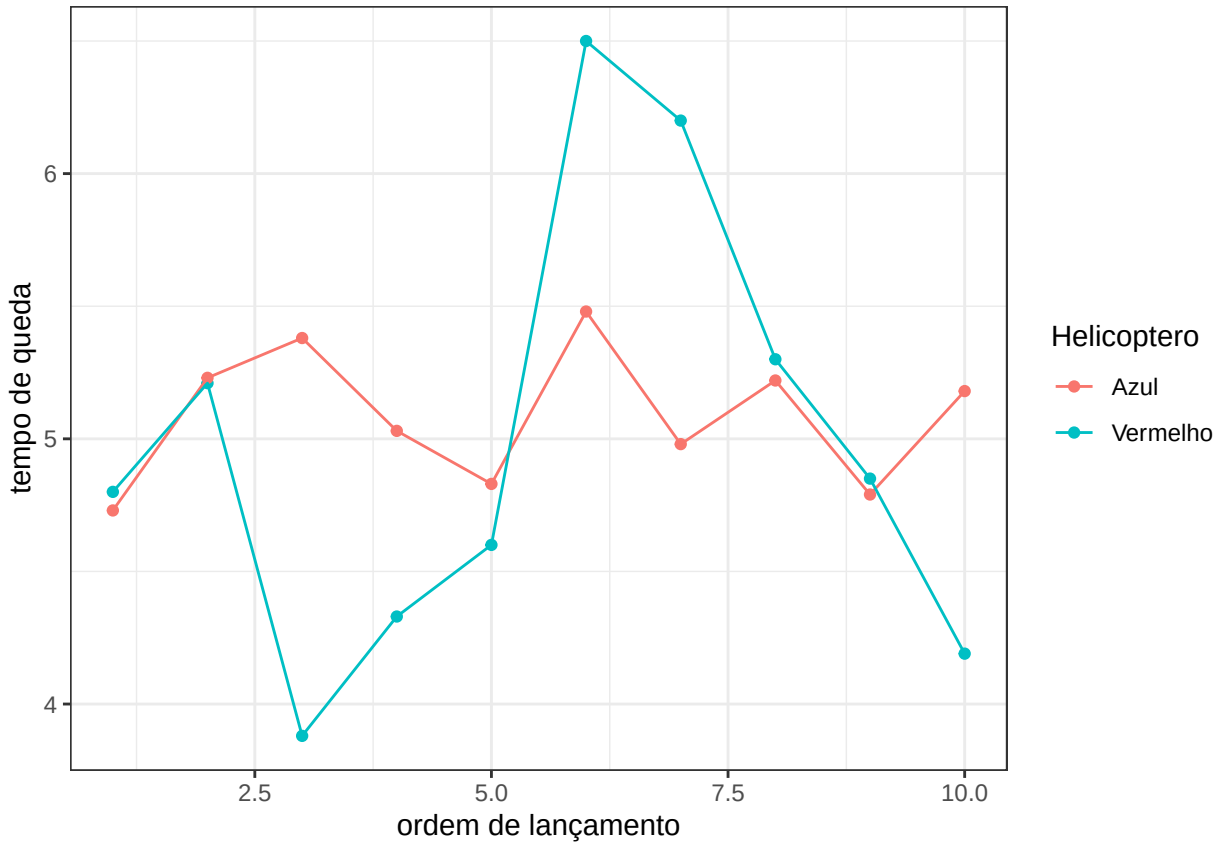
```
medidas.resumo %>% ggplot(aes(x=Helicoptero, y=Media, fill = Helicoptero)) +
  geom_bar(stat="identity", color="black", position=position_dodge()) +
  geom_errorbar(aes(ymin=Media-SD, ymax=Media+SD), width=.2, position=position_dodge(.9), colour = "bla
  labs(title="...", x="Helicóptero", y = "Tempo de queda (segundos)")+
  scale_fill_manual(values=c('#0000FF','#FF3300'))+
  theme_bw()
```

...



Coorte:

```
exp1$Ordem <- rep(1:10,2)
exp1 %>% ggplot(aes(x= Ordem, y = Tmariana, color = Helicoptero)) + geom_point()+
  geom_line()+
  labs(x = "ordem de lançamento", y = "tempo de queda")+
  theme_bw()
```



Suposição independencia

```
#Sim
```

Suposição: normalidade para cada um dos Helicopteros

H0: os dados apresentam dist Normal H1: Nao há normalidade Alfa 5%

```
vermelho.mariana <- exp1 %>% select(Helicoptero, Tmariana) %>% filter(Helicoptero == "Vermelho")
shapiro.test(vermelho.mariana$Tmariana)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  vermelho.mariana$Tmariana
## W = 0.93668, p-value = 0.5167
```

```
#nao rejeito HO

azul.mariana <- exp1 %>% select(Helicoptero, Tmariana) %>% filter(Helicoptero == "Azul")
shapiro.test(azul.mariana$Tmariana)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  azul.mariana$Tmariana
```

```
## W = 0.95282, p-value = 0.7019
```

```
#nao rejeito HO
```

Teste de homocedasticidade

H0: variancias homogeneas H1: Variancias nao sao homogeneas alfa 5%

```
library(car)
```

```
## 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
```

```
leveneTest(Tmariana ~ Helicoptero, exp1, center = mean)
```

```
## Warning in leveneTest.default(y = y, group = group, ...): group coerced to
## factor.
```

```
## Levene's Test for Homogeneity of Variance (center = mean)
##       Df F value  Pr(>F)
## group  1  7.6926 0.01253 *
##       18
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#rejeito HO
```

Teste t-student heterocedástico

HO: a media de tempo do helicopt vermelho = media tempo do helicoptero azul h1: as médias sao diferentes alfa: 5%

```
t.test(vermelho.mariana$Tmariana, azul.mariana$Tmariana, alternative = "two.sided", var.equal = FALSE)
```

```
##
##  Welch Two Sample t-test
##
## data:  vermelho.mariana$Tmariana and azul.mariana$Tmariana
## t = -0.3553, df = 10.626, p-value = 0.7293
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.7149175  0.5169175
## sample estimates:
## mean of x mean of y
##     4.986     5.085
```

```
#não rejeito HO
```