

```

# Librerías
library(ggplot2) #Graficas
library(dplyr) #Ordenar datos
library(reshape2) #Ordenar datos
library(tidyverse) #Mas datos
library(RColorBrewer) #Colores personalizados
library(modeest) #Datos
library(EnvStats) #CV
library(scales) #Tortas

# R Commander
library(Rcmdr)

# Importar datos
EAlumnos <-
  readXL("G:/Mi unidad/III Semestre/Probabilidad y Estadística Fundamental/Parcial/Alumnos.xlsx",
         rownames=FALSE, header=TRUE, na="", sheet="alumnos%20simulados",
         stringsAsFactors=TRUE)
alumnos <- data.frame(EAlumnos)

# Punto 2: Gráficas género, carrera y estrato
## Barras
p2_alumnos <- alumnos %>% count(carrera,genero,Estrato) %>% group_by(carrera,genero,Estrato) # SE ME

p2_colores = brewer.pal(n = 9, "YlGnBu")[3:9]

ggplot(p2_alumnos, aes(x=carrera, y=n, fill=forcats::fct_rev(factor(Estrato)))) +
  facet_wrap(~ genero, scales = "free_x") +
  scale_fill_manual(values=p2_colores) +
  geom_col(position = position_stack()) +
  xlab("Carreras") + ylab("Cantidad de estudiantes") +
  labs(title="Cantidad de estudiantes por carrera, género y estrato", fill="Estrato", caption="Grupo 5") +
  theme_light()

## Torta
### Género
p2_colores_2 = brewer.pal(n = 9, "YlGnBu")[4:9]

p2_g <- alumnos %>%
  group_by(genero) %>%
  summarise(n = n()) %>%
  mutate(prop = n / sum(n) *100) %>%
  mutate(ypos = 37*cumsum(prop)- 5*prop )

ggplot(p2_g, aes(x="", y=n, fill=forcats::fct_rev(factor(genero)))) +
  geom_col(position = position_stack()) +
  scale_fill_manual(values=p2_colores_2) +
  xlab("") + ylab("") +
  labs(title="Proporción de género", fill="Género", caption="Grupo 5") +
  coord_polar("y", start=0) +
  geom_text(aes(x=1.6,y = c(1250,3750), label = n), color = "black", size=4.5) +
  theme_void()

```

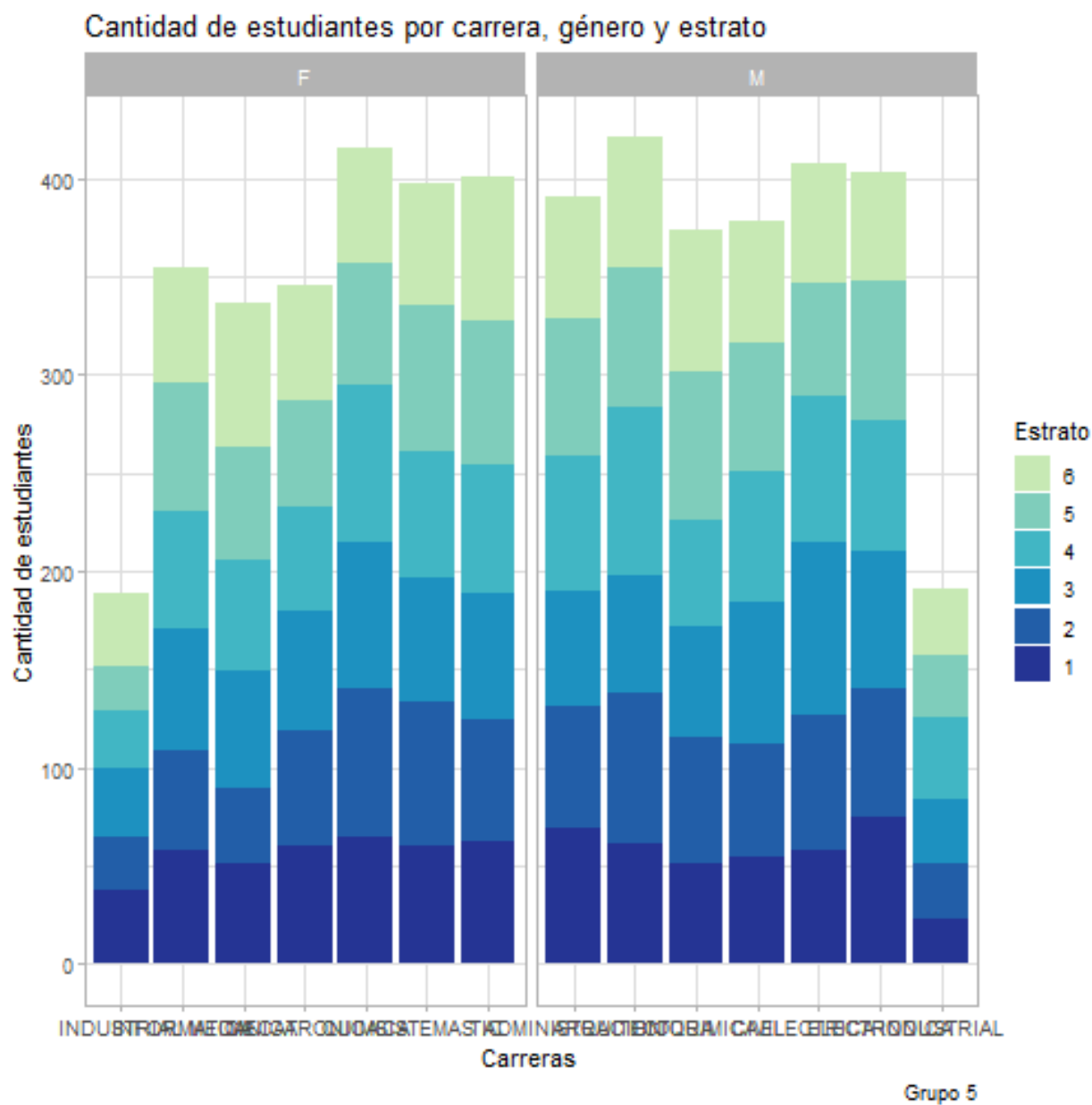
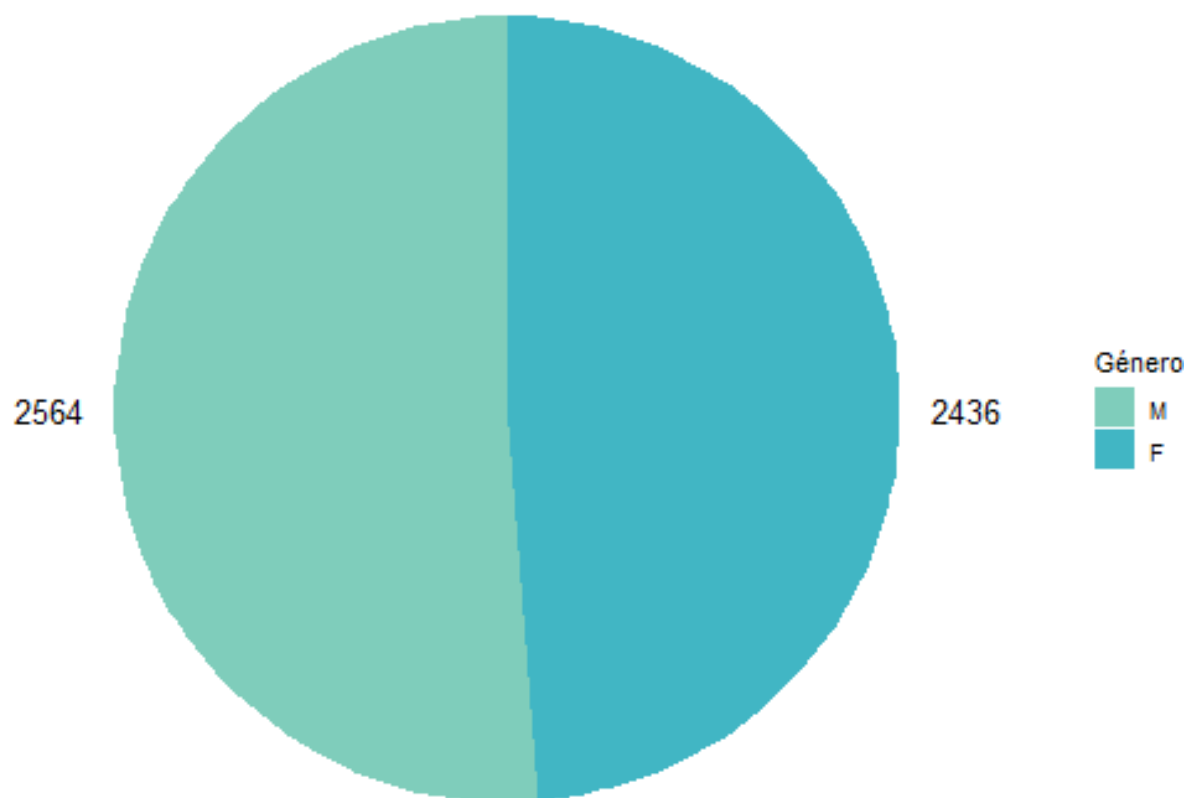


Figure 1: plot of chunk unnamed-chunk-1

Proporción de género



Grupo 5

Figure 2: plot of chunk unnamed-chunk-1

```

### Estrato
p2_e <- alumnos %>%
  group_by(Estrato) %>%
  summarise(n = n()) %>%
  mutate(prop = n / sum(n) *100) %>%
  mutate(ypos = 46*cumsum(prop)- 12*prop )

ggplot(p2_e, aes(x="", y=n, fill=forcats::fct_rev(factor(Estrato)))) +
  geom_col(position = position_stack()) +
  scale_fill_manual(values=p2_colores) +
  xlab("") + ylab("") +
  labs(title="Proporción de estrato", fill="Estrato", caption="Grupo 5") +
  coord_polar("y", start=0) +
  geom_text(aes(x=1.6,y = ypos, label = n), color = "black", size=4.2) +
  theme_void()

```

```

### Carrera
colourCount = length(unique(alumnos$carrera))
p2_colores_3 = colorRampPalette(brewer.pal(9, "Set1"))

p2_c <- alumnos %>%
  group_by(carrera) %>%
  summarise(n = n()) %>%
  mutate(prop = n / sum(n) *100) %>%
  mutate(ypos = 50*cumsum(prop)- 20*prop )

ggplot(p2_c, aes(x="", y=n, fill=forcats::fct_rev(factor(carrera)))) +
  geom_col(position = position_stack()) +
  scale_fill_manual(values=p2_colores_3(colourCount)) +
  xlab("") + ylab("") +
  labs(title="Proporción de carrera", fill="Carrera", caption="Grupo 5") +
  coord_polar("y", start=0) +
  geom_text(aes(x=1.6,y = ypos, label = n), color = "black", size=4.2) +
  theme_void()

```

```

# Punto 3: Carrera y género
p3_al <- alumnos %>% count(carrera,genero) %>% group_by(carrera,genero)
p3_ta = cbind(p3_al)
p3_ta

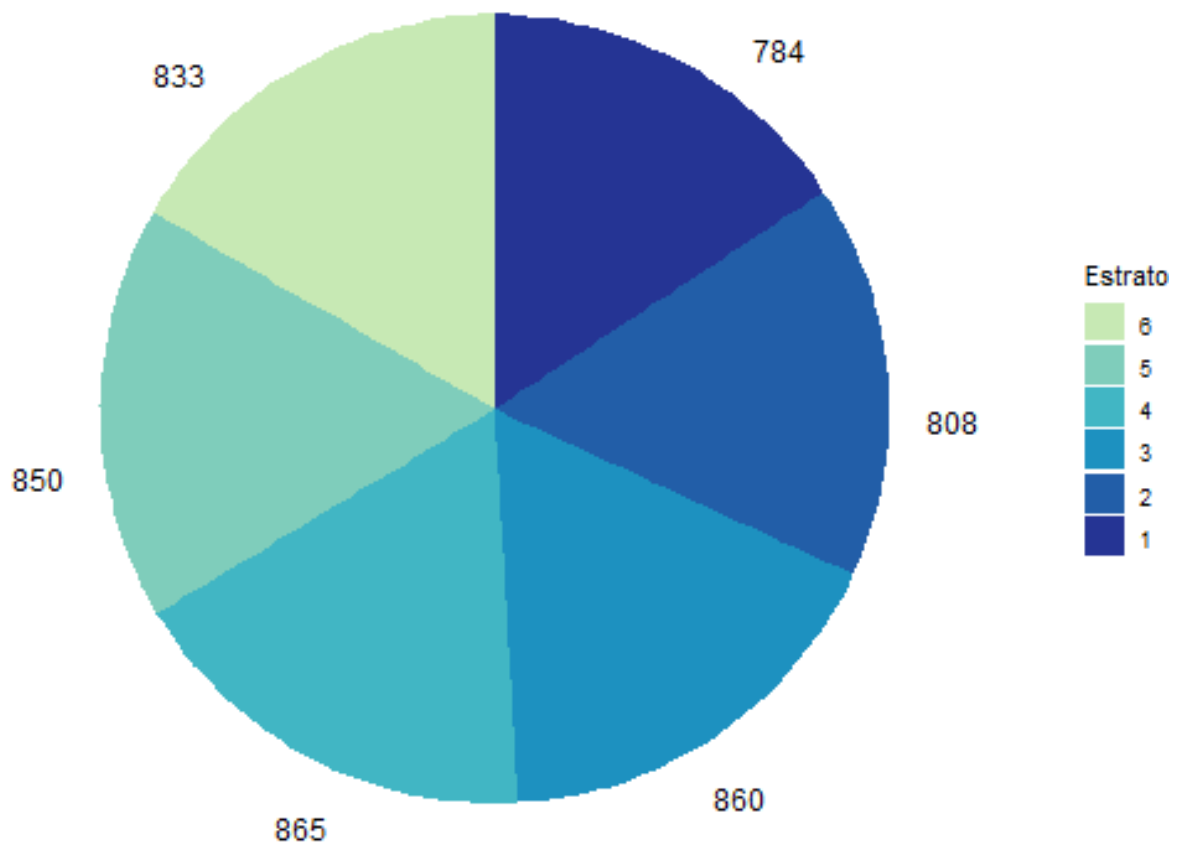
```

```

## # A tibble: 14 x 3
## # Groups:   carrera, genero [14]
##   carrera      genero      n
##   <fct>      <fct> <int>
## 1 ADMINISTRACION M       390
## 2 ARQUITECTURA M       421
## 3 BIOQUIMICA M       374
## 4 CIVIL M       378
## 5 ELECTRICA M       407
## 6 ELECTRONICA M       403
## 7 INDUSTRIAL F       188
## 8 INDUSTRIAL M       191
## 9 INFORMATICA F       354
## 10 MECANICA F       336

```

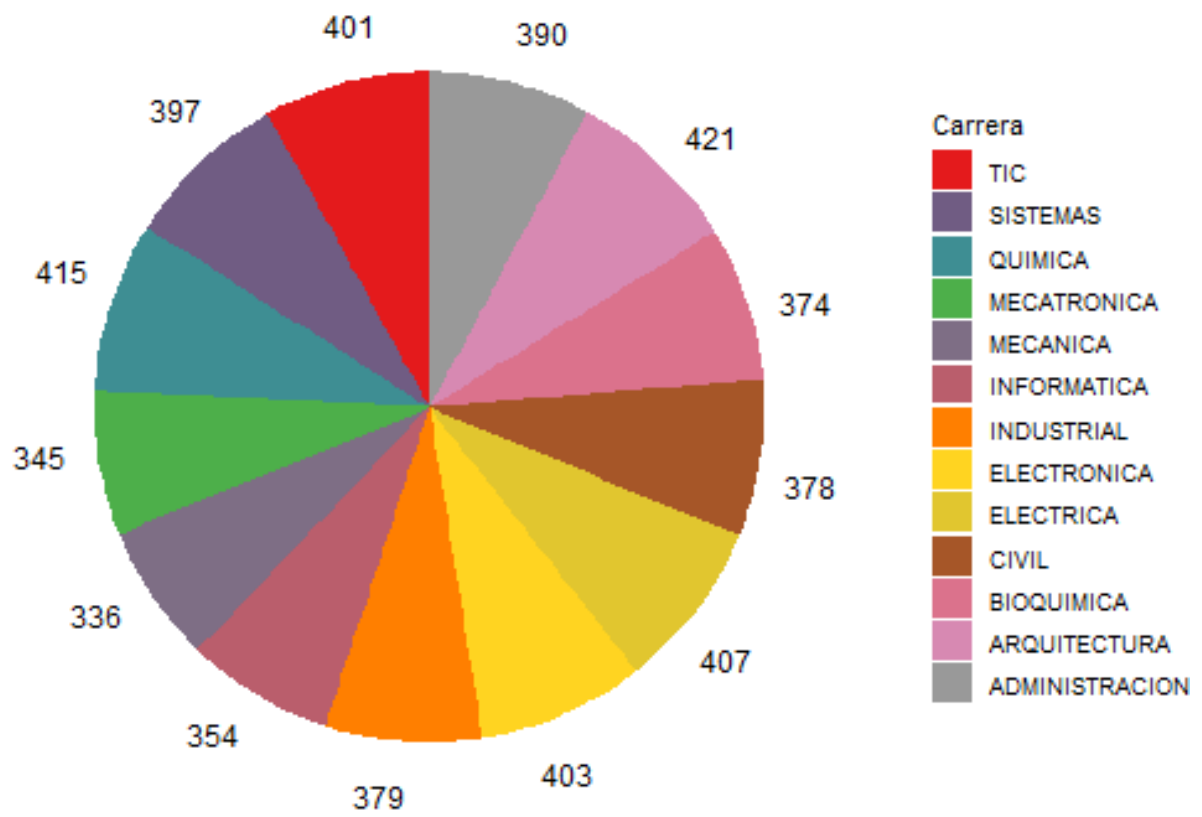
Proporción de estrato



Grupo 5

Figure 3: plot of chunk unnamed-chunk-1

Proporción de carrera



Grupo 5

Figure 4: plot of chunk unnamed-chunk-1

```
## 11 MECATRONICA      F      345
## 12 QUIMICA           F      415
## 13 SISTEMAS         F      397
## 14 TIC               F      401

# Punto 4: Freq rel carrera y estrato
p4_al <- alumnos %>% group_by(carrera, Estrato) %>% summarise(n = n()) %>% mutate(freq=n/sum(n)) %>%
  select(carrera,Estrato,freq) %>% pivot_wider(names_from = Estrato, values_from = freq)

## `summarise()` has grouped output by 'carrera'. You can override using the `.groups` argument.

p4_ta = cbind(p4_al)
p4_ta

## # A tibble: 13 x 7
## # Groups:   carrera [13]
##   carrera      `1`      `2`      `3`      `4`      `5`      `6`
##   <fct>      <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
## 1 ADMINISTRACION 0.177 0.159 0.151 0.177 0.177 0.159
## 2 ARQUITECTURA  0.145 0.183 0.143 0.202 0.169 0.159
## 3 BIOQUIMICA     0.136 0.171 0.152 0.144 0.201 0.195
## 4 CIVIL          0.143 0.153 0.190 0.177 0.172 0.164
## 5 ELECTRICA      0.143 0.170 0.216 0.182 0.143 0.147
## 6 ELECTRONICA    0.186 0.161 0.174 0.166 0.176 0.136
## 7 INDUSTRIAL    0.158 0.148 0.177 0.187 0.142 0.187
## 8 INFORMATICA    0.164 0.141 0.178 0.167 0.186 0.164
## 9 MECANICA       0.152 0.113 0.179 0.167 0.173 0.217
## 10 MECATRONICA   0.174 0.171 0.174 0.157 0.157 0.168
## 11 QUIMICA       0.157 0.181 0.181 0.193 0.149 0.140
## 12 SISTEMAS     0.151 0.184 0.161 0.161 0.186 0.156
## 13 TIC          0.155 0.155 0.162 0.162 0.182 0.185

# Punto 5: Gráficos edad
## Barras
p5_alumnos <- alumnos %>% group_by(carrera,edad) %>% count(carrera)

p5_colores = brewer.pal(n = 9, "YlGnBu")[1:9]

ggplot(p5_alumnos, aes(x=carrera, y=n, fill=forcats::fct_rev(factor(edad)))) +
  scale_fill_manual(values=p5_colores) +
  geom_col(position = position_stack()) +
  xlab("Carreras") + ylab("Cantidad de estudiantes") +
  labs(title="Cantidad de estudiantes por Edad", fill="Edad", caption="Grupo 5") +
  theme_light()

## Torta
p5_e <- alumnos %>%
  group_by(edad) %>%
  summarise(n = n()) %>%
  mutate(prop = n / sum(n) *100) %>%
  mutate(ypos = 50*cumsum(prop)- 20*prop )

ggplot(p5_e, aes(x="", y=n, fill=forcats::fct_rev(factor(edad)))) +
  geom_col(position = position_stack()) +
  scale_fill_manual(values=p5_colores) +
  xlab("") + ylab("") +
```

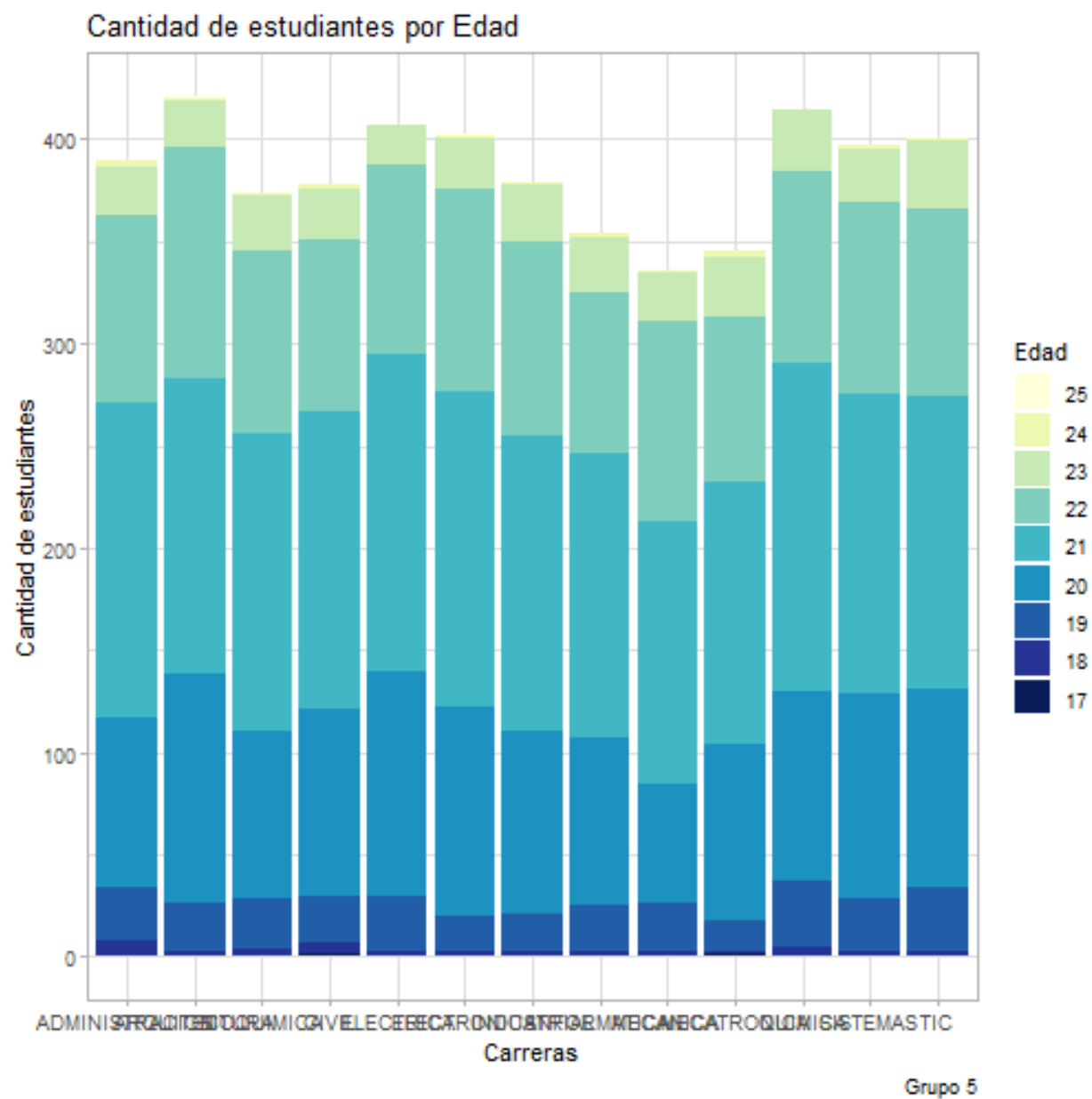


Figure 5: plot of chunk unnamed-chunk-1


```
labs(title="Proporción de edad", fill="Edad", caption="Grupo 5") +
coord_polar("y", start=0) +
geom_text(aes(x=1.6, y = ypos, label = c("", "", 310, 1187, 1891, 1204, 339, "", "")), color = "black", size=
theme_void()
```

Proporción de edad

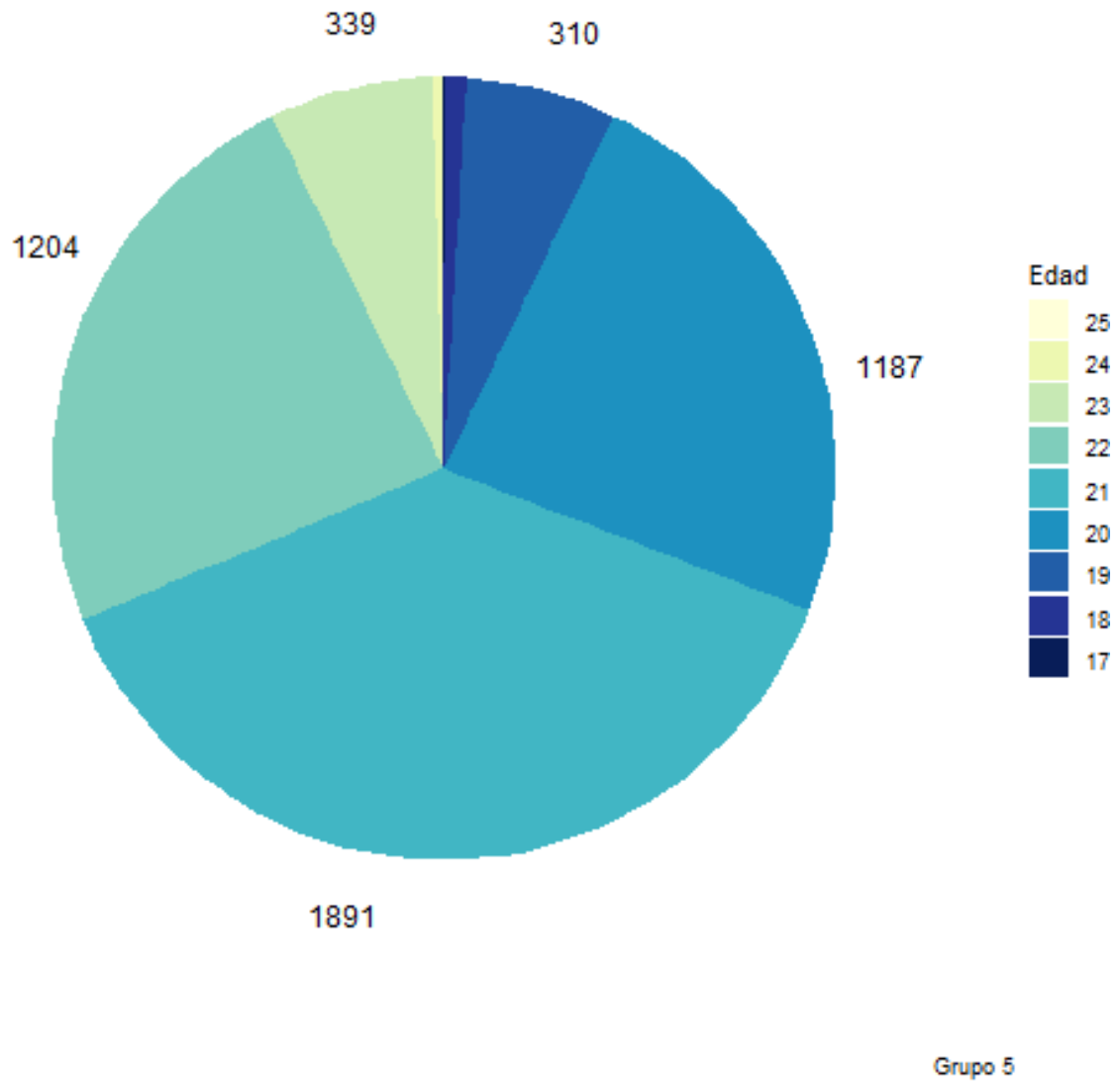


Figure 6: plot of chunk unnamed-chunk-1

```
# Punto 6: Gráficas var. continuas
## Promedio
### Histograma
p6_alumnos <- alumnos %>% select(promedio,peso,altura,genero)

p6_breaks_p <- pretty(range(p6_alumnos$promedio), n=nclass.Sturges((p6_alumnos$promedio)), min.n=1)
```

```
ggplot(p6_alumnos, aes(x=promedio)) +
  geom_histogram(breaks=p6_breaks_p, fill="#4DD9EA", color="#1D91C0") +
  xlab("Promedio") + ylab("Cantidad de estudiantes") +
  labs(title="Histograma de promedio", caption="Grupo 5")
```

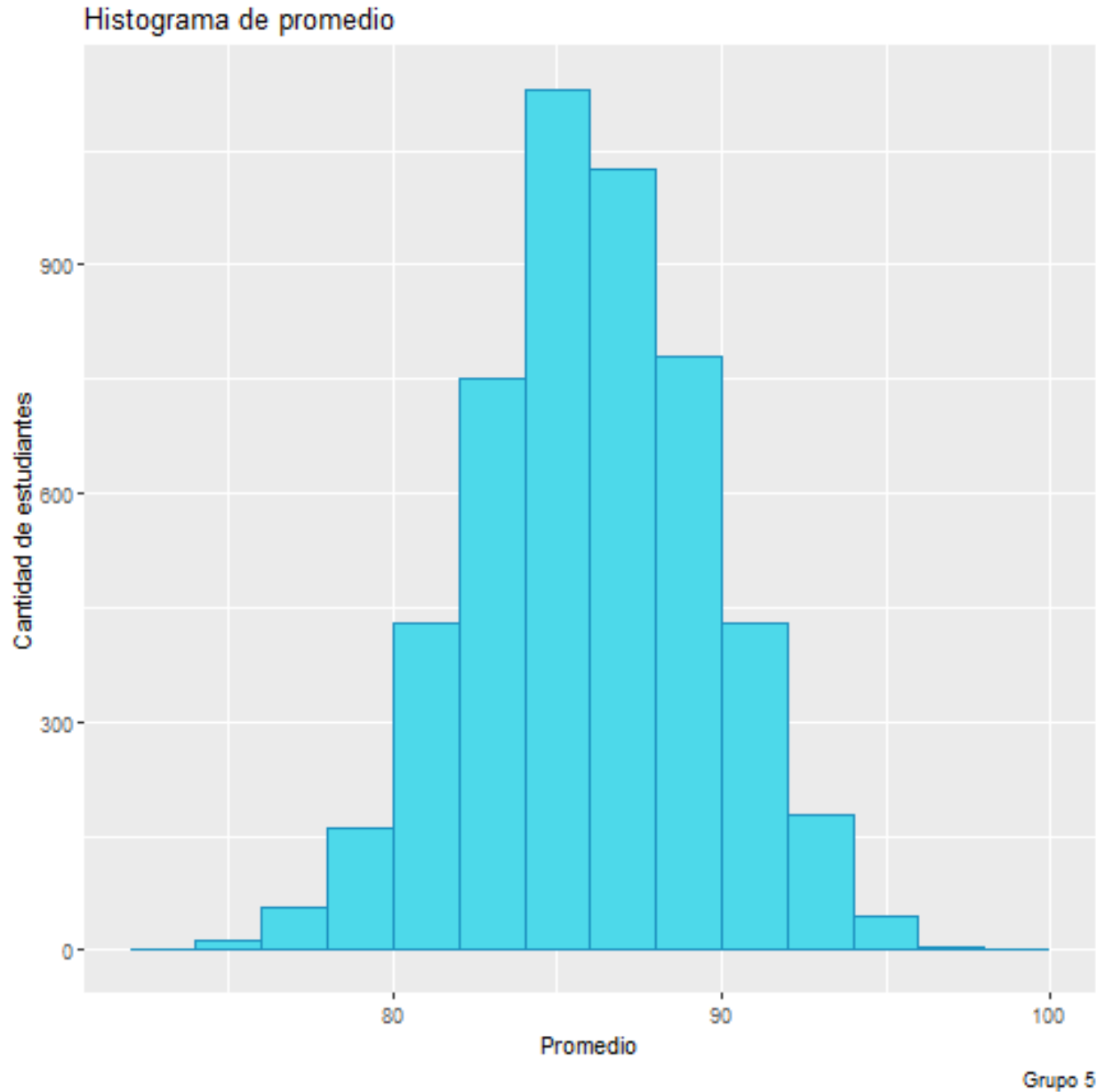


Figure 7: plot of chunk unnamed-chunk-1

```
theme_light()
```

```
## List of 93
## $ line :List of 6
## ..$ colour : chr "black"
## ..$ size : num 0.5
```

```

## ..$ linetype      : num 1
## ..$ lineend       : chr "butt"
## ..$ arrow         : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ rect              :List of 5
## ..$ fill          : chr "white"
## ..$ colour        : chr "black"
## ..$ size          : num 0.5
## ..$ linetype      : num 1
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ text              :List of 11
## ..$ family        : chr ""
## ..$ face          : chr "plain"
## ..$ colour        : chr "black"
## ..$ size          : num 11
## ..$ hjust         : num 0.5
## ..$ vjust         : num 0.5
## ..$ angle         : num 0
## ..$ lineheight    : num 0.9
## ..$ margin        : 'margin' num [1:4] 0points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug         : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ title            : NULL
## $ aspect.ratio     : NULL
## $ axis.title        : NULL
## $ axis.title.x      :List of 11
## ..$ family        : NULL
## ..$ face          : NULL
## ..$ colour        : NULL
## ..$ size          : NULL
## ..$ hjust         : NULL
## ..$ vjust         : num 1
## ..$ angle         : NULL
## ..$ lineheight    : NULL
## ..$ margin        : 'margin' num [1:4] 2.75points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.top  :List of 11
## ..$ family        : NULL
## ..$ face          : NULL
## ..$ colour        : NULL
## ..$ size          : NULL
## ..$ hjust         : NULL
## ..$ vjust         : num 0
## ..$ angle         : NULL
## ..$ lineheight    : NULL
## ..$ margin        : 'margin' num [1:4] 0points 0points 2.75points 0points
## .. ..- attr(*, "unit")= int 8

```

```

## ..$ debug          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.bottom      : NULL
## $ axis.title.y             :List of 11
## ..$ family             : NULL
## ..$ face               : NULL
## ..$ colour            : NULL
## ..$ size               : NULL
## ..$ hjust             : NULL
## ..$ vjust             : num 1
## ..$ angle             : num 90
## ..$ lineheight        : NULL
## ..$ margin            : 'margin' num [1:4] 0points 2.75points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.y.left       : NULL
## $ axis.title.y.right      :List of 11
## ..$ family            : NULL
## ..$ face              : NULL
## ..$ colour            : NULL
## ..$ size              : NULL
## ..$ hjust            : NULL
## ..$ vjust            : num 0
## ..$ angle            : num -90
## ..$ lineheight        : NULL
## ..$ margin            : 'margin' num [1:4] 0points 0points 0points 2.75points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text              :List of 11
## ..$ family            : NULL
## ..$ face              : NULL
## ..$ colour            : chr "grey30"
## ..$ size              : 'rel' num 0.8
## ..$ hjust            : NULL
## ..$ vjust            : NULL
## ..$ angle            : NULL
## ..$ lineheight        : NULL
## ..$ margin            : NULL
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x            :List of 11
## ..$ family            : NULL
## ..$ face              : NULL
## ..$ colour            : NULL
## ..$ size              : NULL
## ..$ hjust            : NULL
## ..$ vjust            : num 1
## ..$ angle            : NULL

```

```

## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 2.2points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.top :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : num 0
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 0points 0points 2.2points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.bottom : NULL
## $ axis.text.y :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : num 1
## ..$ vjust : NULL
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 0points 2.2points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.y.left : NULL
## $ axis.text.y.right :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : num 0
## ..$ vjust : NULL
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 0points 0points 0points 2.2points
## .. ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.ticks :List of 6
## ..$ colour : chr "grey70"
## ..$ size : 'rel' num 0.5
## ..$ linetype : NULL

```

```

## ..$ lineend      : NULL
## ..$ arrow        : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ axis.ticks.x      : NULL
## $ axis.ticks.x.top   : NULL
## $ axis.ticks.x.bottom : NULL
## $ axis.ticks.y      : NULL
## $ axis.ticks.y.left  : NULL
## $ axis.ticks.y.right : NULL
## $ axis.ticks.length  : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ axis.ticks.length.x : NULL
## $ axis.ticks.length.x.top : NULL
## $ axis.ticks.length.x.bottom: NULL
## $ axis.ticks.length.y : NULL
## $ axis.ticks.length.y.left : NULL
## $ axis.ticks.length.y.right : NULL
## $ axis.line          : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ axis.line.x        : NULL
## $ axis.line.x.top     : NULL
## $ axis.line.x.bottom  : NULL
## $ axis.line.y         : NULL
## $ axis.line.y.left    : NULL
## $ axis.line.y.right   : NULL
## $ legend.background   :List of 5
## ..$ fill              : NULL
## ..$ colour            : logi NA
## ..$ size              : NULL
## ..$ linetype          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.margin       : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ legend.spacing      : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ legend.spacing.x    : NULL
## $ legend.spacing.y    : NULL
## $ legend.key           :List of 5
## ..$ fill              : chr "white"
## ..$ colour            : logi NA
## ..$ size              : NULL
## ..$ linetype          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.key.size     : 'simpleUnit' num 1.2lines
## ..- attr(*, "unit")= int 3
## $ legend.key.height   : NULL
## $ legend.key.width    : NULL
## $ legend.text         :List of 11
## ..$ family            : NULL
## ..$ face               : NULL
## ..$ colour            : NULL

```

```

## ..$ size          : 'rel' num 0.8
## ..$ hjust         : NULL
## ..$ vjust         : NULL
## ..$ angle         : NULL
## ..$ lineheight    : NULL
## ..$ margin        : NULL
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.text.align      : NULL
## $ legend.title           :List of 11
## ..$ family             : NULL
## ..$ face               : NULL
## ..$ colour            : NULL
## ..$ size              : NULL
## ..$ hjust             : num 0
## ..$ vjust            : NULL
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin          : NULL
## ..$ debug           : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.title.align    : NULL
## $ legend.position      : chr "right"
## $ legend.direction     : NULL
## $ legend.justification : chr "center"
## $ legend.box           : NULL
## $ legend.box.just      : NULL
## $ legend.box.margin    : 'margin' num [1:4] 0cm 0cm 0cm 0cm
## ..- attr(*, "unit")= int 1
## $ legend.box.background : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ legend.box.spacing   : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ panel.background     :List of 5
## ..$ fill              : chr "white"
## ..$ colour           : logi NA
## ..$ size             : NULL
## ..$ linetype         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.border        :List of 5
## ..$ fill             : logi NA
## ..$ colour          : chr "grey70"
## ..$ size            : 'rel' num 1
## ..$ linetype       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.spacing      : 'simpleUnit' num 5.5points
## ..- attr(*, "unit")= int 8
## $ panel.spacing.x    : NULL
## $ panel.spacing.y    : NULL
## $ panel.grid         :List of 6

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## ..$ colour      : chr "grey87"
## ..$ size        : NULL
## ..$ linetype    : NULL
## ..$ lineend     : NULL
## ..$ arrow       : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major      :List of 6
## ..$ colour          : NULL
## ..$ size            : 'rel' num 0.5
## ..$ linetype        : NULL
## ..$ lineend         : NULL
## ..$ arrow           : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.minor      :List of 6
## ..$ colour          : NULL
## ..$ size            : 'rel' num 0.25
## ..$ linetype        : NULL
## ..$ lineend         : NULL
## ..$ arrow           : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major.x    : NULL
## $ panel.grid.major.y    : NULL
## $ panel.grid.minor.x    : NULL
## $ panel.grid.minor.y    : NULL
## $ panel.ontop           : logi FALSE
## $ plot.background       :List of 5
## ..$ fill             : NULL
## ..$ colour           : chr "white"
## ..$ size             : NULL
## ..$ linetype         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ plot.title            :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : 'rel' num 1.2
## ..$ hjust            : num 0
## ..$ vjust            : num 1
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 0points 5.5points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.title.position   : chr "panel"
## $ plot.subtitle         :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL

```



```

## ..$ size          : NULL
## ..$ hjust         : num 0
## ..$ vjust         : num 1
## ..$ angle         : NULL
## ..$ lineheight    : NULL
## ..$ margin        : 'margin' num [1:4] 0points 0points 5.5points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption      :List of 11
## ..$ family         : NULL
## ..$ face           : NULL
## ..$ colour         : NULL
## ..$ size           : 'rel' num 0.8
## ..$ hjust         : num 1
## ..$ vjust         : num 1
## ..$ angle         : NULL
## ..$ lineheight    : NULL
## ..$ margin        : 'margin' num [1:4] 5.5points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption.position : chr "panel"
## $ plot.tag           :List of 11
## ..$ family         : NULL
## ..$ face           : NULL
## ..$ colour         : NULL
## ..$ size           : 'rel' num 1.2
## ..$ hjust         : num 0.5
## ..$ vjust         : num 0.5
## ..$ angle         : NULL
## ..$ lineheight    : NULL
## ..$ margin        : NULL
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.tag.position   : chr "topleft"
## $ plot.margin         : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ strip.background    :List of 5
## ..$ fill             : chr "grey70"
## ..$ colour          : logi NA
## ..$ size            : NULL
## ..$ linetype        : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ strip.background.x  : NULL
## $ strip.background.y  : NULL
## $ strip.placement     : chr "inside"
## $ strip.text          :List of 11
## ..$ family         : NULL
## ..$ face           : NULL

```

```

## ..$ colour      : chr "white"
## ..$ size        : 'rel' num 0.8
## ..$ hjust       : NULL
## ..$ vjust       : NULL
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points
## ..$.- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..$.- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.x   : NULL
## $ strip.text.y   :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : NULL
## ..$ angle       : num -90
## ..$ lineheight  : NULL
## ..$ margin      : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..$.- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.switch.pad.grid : 'simpleUnit' num 2.75points
## ..$.- attr(*, "unit")= int 8
## $ strip.switch.pad.wrap : 'simpleUnit' num 2.75points
## ..$.- attr(*, "unit")= int 8
## $ strip.text.y.left   :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : NULL
## ..$ angle       : num 90
## ..$ lineheight  : NULL
## ..$ margin      : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..$.- attr(*, "class")= chr [1:2] "element_text" "element"
## - attr(*, "class")= chr [1:2] "theme" "gg"
## - attr(*, "complete")= logi TRUE
## - attr(*, "validate")= logi TRUE

```

Caja

```

ggplot(p6_alumnos, aes(x="", y=promedio)) +
  geom_boxplot(outlier.colour = "red", fill="#4DD9EA") +
  stat_summary(fun=mean, geom="point", shape=17, size=4) +
  coord_flip() +
  theme_light()

```

Peso

Histograma

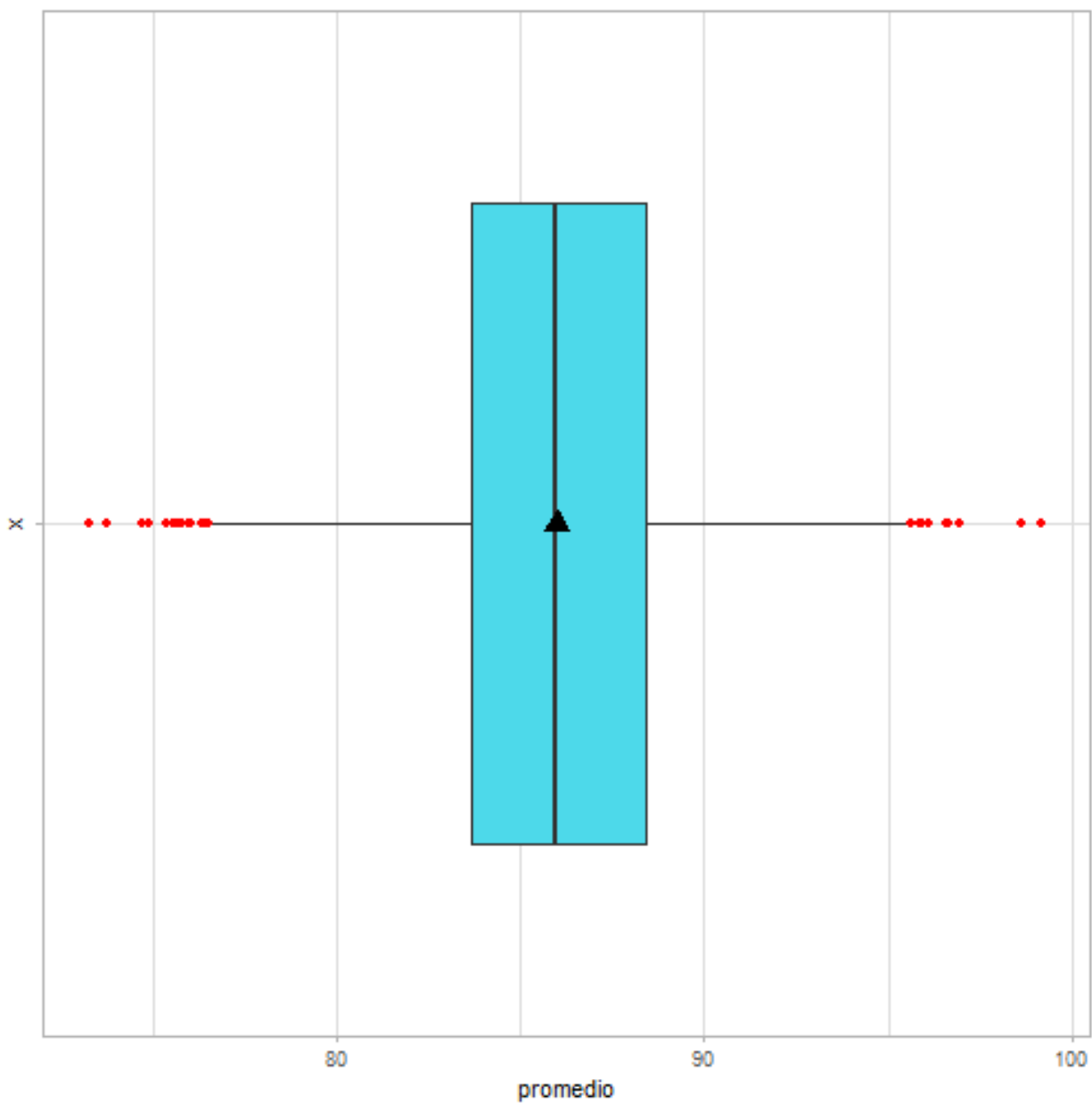


Figure 8: plot of chunk unnamed-chunk-1

```
p6_breaks_pe <- pretty(range(p6_alumnos$peso), n=nclass.Sturges((p6_alumnos$peso)), min.n=1)

ggplot(p6_alumnos, aes(x=peso)) +
  geom_histogram(breaks=p6_breaks_pe, fill="#4DD9EA", color="#1D91C0") +
  xlab("Peso") + ylab("Cantidad de estudiantes") +
  labs(title="Histograma de peso", caption="Grupo 5")
```

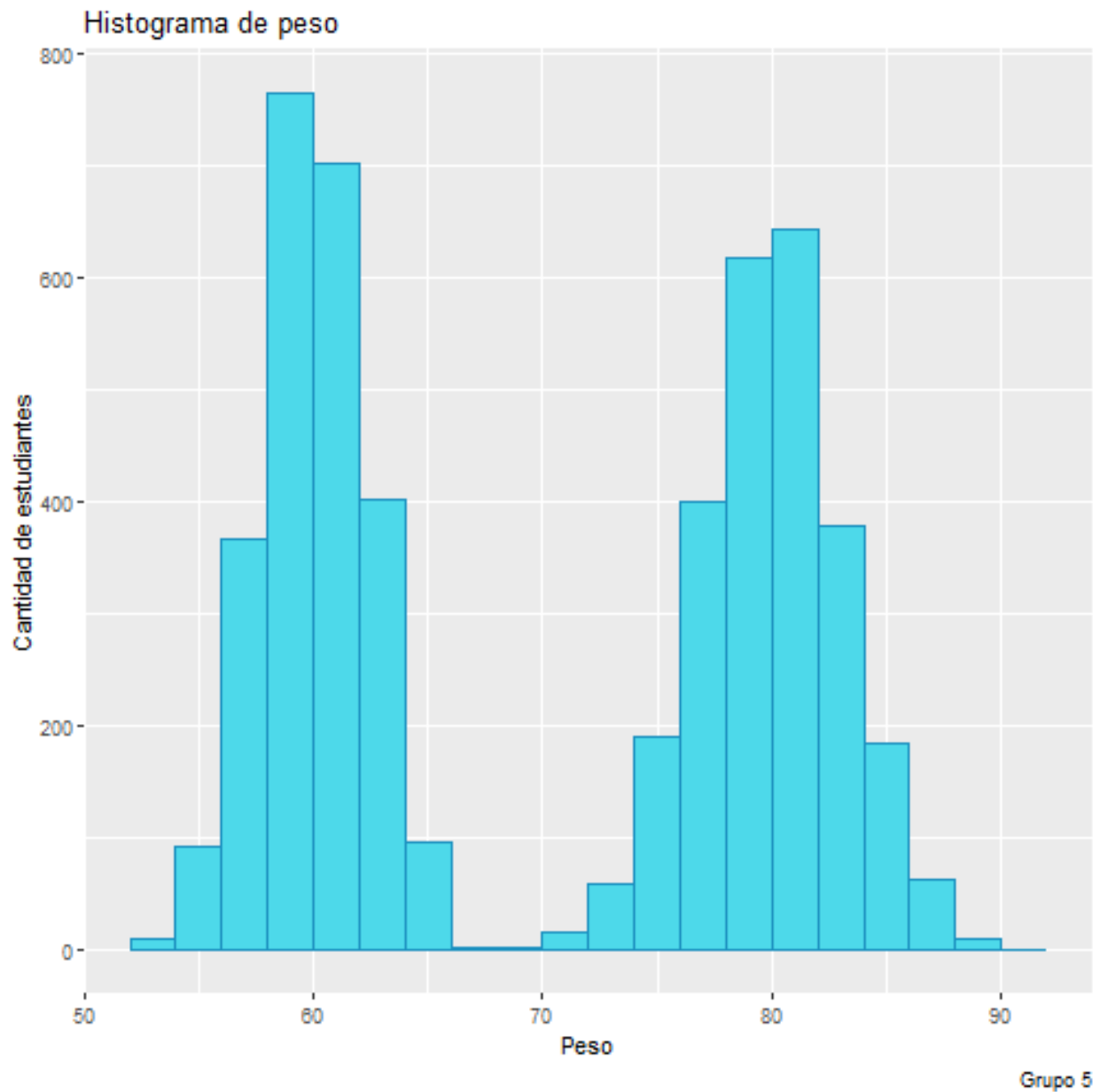


Figure 9: plot of chunk unnamed-chunk-1

```
theme_light()

## List of 93
## $ line :List of 6
## ..$ colour : chr "black"
```

```

## ..$ size      : num 0.5
## ..$ linetype   : num 1
## ..$ lineend    : chr "butt"
## ..$ arrow      : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ rect          :List of 5
## ..$ fill        : chr "white"
## ..$ colour      : chr "black"
## ..$ size        : num 0.5
## ..$ linetype    : num 1
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ text          :List of 11
## ..$ family      : chr ""
## ..$ face        : chr "plain"
## ..$ colour      : chr "black"
## ..$ size        : num 11
## ..$ hjust       : num 0.5
## ..$ vjust       : num 0.5
## ..$ angle       : num 0
## ..$ lineheight  : num 0.9
## ..$ margin      : 'margin' num [1:4] 0points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ title         : NULL
## $ aspect.ratio   : NULL
## $ axis.title     : NULL
## $ axis.title.x    :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 2.75points 0points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.top :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : NULL
## ..$ vjust       : num 0
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 0points 0points 2.75points 0points

```

```

## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.bottom : NULL
## $ axis.title.y :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : num 1
## ..$ angle : num 90
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 0points 2.75points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.y.left : NULL
## $ axis.title.y.right :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : num 0
## ..$ angle : num -90
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 0points 0points 0points 2.75points
## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : chr "grey30"
## ..$ size : 'rel' num 0.8
## ..$ hjust : NULL
## ..$ vjust : NULL
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : NULL
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : num 1

```

```

## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin      : 'margin' num [1:4] 2.2points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.top      :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : num 0
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 0points 2.2points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.bottom   : NULL
## $ axis.text.y          :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : num 1
## ..$ vjust            : NULL
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 2.2points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.y.left     : NULL
## $ axis.text.y.right    :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : num 0
## ..$ vjust            : NULL
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 0points 0points 2.2points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.ticks           :List of 6
## ..$ colour           : chr "grey70"
## ..$ size             : 'rel' num 0.5

```

```

## ..$ linetype      : NULL
## ..$ lineend       : NULL
## ..$ arrow         : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ axis.ticks.x      : NULL
## $ axis.ticks.x.top   : NULL
## $ axis.ticks.x.bottom : NULL
## $ axis.ticks.y      : NULL
## $ axis.ticks.y.left  : NULL
## $ axis.ticks.y.right : NULL
## $ axis.ticks.length  : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ axis.ticks.length.x : NULL
## $ axis.ticks.length.x.top : NULL
## $ axis.ticks.length.x.bottom: NULL
## $ axis.ticks.length.y : NULL
## $ axis.ticks.length.y.left : NULL
## $ axis.ticks.length.y.right : NULL
## $ axis.line          : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ axis.line.x        : NULL
## $ axis.line.x.top     : NULL
## $ axis.line.x.bottom  : NULL
## $ axis.line.y         : NULL
## $ axis.line.y.left    : NULL
## $ axis.line.y.right   : NULL
## $ legend.background   :List of 5
## ..$ fill              : NULL
## ..$ colour            : logi NA
## ..$ size              : NULL
## ..$ linetype          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.margin       : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ legend.spacing      : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ legend.spacing.x    : NULL
## $ legend.spacing.y    : NULL
## $ legend.key           :List of 5
## ..$ fill              : chr "white"
## ..$ colour            : logi NA
## ..$ size              : NULL
## ..$ linetype          : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.key.size     : 'simpleUnit' num 1.2lines
## ..- attr(*, "unit")= int 3
## $ legend.key.height   : NULL
## $ legend.key.width    : NULL
## $ legend.text         :List of 11
## ..$ family            : NULL
## ..$ face               : NULL

```



```

## ..$ colour      : NULL
## ..$ size        : 'rel' num 0.8
## ..$ hjust       : NULL
## ..$ vjust       : NULL
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.text.align      : NULL
## $ legend.title           :List of 11
## ..$ family              : NULL
## ..$ face                : NULL
## ..$ colour              : NULL
## ..$ size                : NULL
## ..$ hjust               : num 0
## ..$ vjust               : NULL
## ..$ angle               : NULL
## ..$ lineheight          : NULL
## ..$ margin              : NULL
## ..$ debug               : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.title.align    : NULL
## $ legend.position       : chr "right"
## $ legend.direction      : NULL
## $ legend.justification  : chr "center"
## $ legend.box            : NULL
## $ legend.box.just       : NULL
## $ legend.box.margin     : 'margin' num [1:4] 0cm 0cm 0cm 0cm
## ..- attr(*, "unit")= int 1
## $ legend.box.background : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ legend.box.spacing    : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ panel.background      :List of 5
## ..$ fill                : chr "white"
## ..$ colour              : logi NA
## ..$ size                : NULL
## ..$ linetype            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.border          :List of 5
## ..$ fill                : logi NA
## ..$ colour              : chr "grey70"
## ..$ size                : 'rel' num 1
## ..$ linetype            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.spacing        : 'simpleUnit' num 5.5points
## ..- attr(*, "unit")= int 8
## $ panel.spacing.x      : NULL
## $ panel.spacing.y      : NULL

```

```

## $ panel.grid                      :List of 6
##   ..$ colour                      : chr "grey87"
##   ..$ size                        : NULL
##   ..$ linetype                    : NULL
##   ..$ lineend                     : NULL
##   ..$ arrow                       : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major                :List of 6
##   ..$ colour                      : NULL
##   ..$ size                        : 'rel' num 0.5
##   ..$ linetype                    : NULL
##   ..$ lineend                     : NULL
##   ..$ arrow                       : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.minor                :List of 6
##   ..$ colour                      : NULL
##   ..$ size                        : 'rel' num 0.25
##   ..$ linetype                    : NULL
##   ..$ lineend                     : NULL
##   ..$ arrow                       : logi FALSE
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major.x              : NULL
## $ panel.grid.major.y              : NULL
## $ panel.grid.minor.x              : NULL
## $ panel.grid.minor.y              : NULL
## $ panel.ontop                     : logi FALSE
## $ plot.background                  :List of 5
##   ..$ fill                        : NULL
##   ..$ colour                      : chr "white"
##   ..$ size                        : NULL
##   ..$ linetype                    : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ plot.title                       :List of 11
##   ..$ family                      : NULL
##   ..$ face                        : NULL
##   ..$ colour                      : NULL
##   ..$ size                        : 'rel' num 1.2
##   ..$ hjust                       : num 0
##   ..$ vjust                       : num 1
##   ..$ angle                       : NULL
##   ..$ lineheight                  : NULL
##   ..$ margin                      : 'margin' num [1:4] 0points 0points 5.5points 0points
##   .. ..- attr(*, "unit")= int 8
##   ..$ debug                       : NULL
##   ..$ inherit.blank: logi TRUE
##   ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.title.position              : chr "panel"
## $ plot.subtitle                    :List of 11
##   ..$ family                      : NULL
##   ..$ face                        : NULL

```

```

## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : num 0
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 0points 0points 5.5points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption   :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : 'rel' num 0.8
## ..$ hjust       : num 1
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 5.5points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption.position : chr "panel"
## $ plot.tag        :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : 'rel' num 1.2
## ..$ hjust       : num 0.5
## ..$ vjust       : num 0.5
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.tag.position : chr "topleft"
## $ plot.margin      : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ strip.background :List of 5
## ..$ fill          : chr "grey70"
## ..$ colour        : logi NA
## ..$ size          : NULL
## ..$ linetype      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ strip.background.x : NULL
## $ strip.background.y : NULL
## $ strip.placement    : chr "inside"
## $ strip.text         :List of 11
## ..$ family          : NULL

```

```

## ..$ face          : NULL
## ..$ colour        : chr "white"
## ..$ size          : 'rel' num 0.8
## ..$ hjust         : NULL
## ..$ vjust         : NULL
## ..$ angle         : NULL
## ..$ lineheight    : NULL
## ..$ margin        : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points
## ..- attr(*, "unit")= int 8
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.x      : NULL
## $ strip.text.y      :List of 11
## ..$ family        : NULL
## ..$ face          : NULL
## ..$ colour        : NULL
## ..$ size          : NULL
## ..$ hjust         : NULL
## ..$ vjust         : NULL
## ..$ angle         : num -90
## ..$ lineheight    : NULL
## ..$ margin        : NULL
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.switch.pad.grid : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ strip.switch.pad.wrap : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ strip.text.y.left   :List of 11
## ..$ family        : NULL
## ..$ face          : NULL
## ..$ colour        : NULL
## ..$ size          : NULL
## ..$ hjust         : NULL
## ..$ vjust         : NULL
## ..$ angle         : num 90
## ..$ lineheight    : NULL
## ..$ margin        : NULL
## ..$ debug         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## - attr(*, "class")= chr [1:2] "theme" "gg"
## - attr(*, "complete")= logi TRUE
## - attr(*, "validate")= logi TRUE

```

Caja

```

ggplot(p6_alumnos, aes(x=genero, y=peso)) +
  geom_boxplot(outlier.colour = "red", fill="#4DD9EA") +
  stat_summary(fun=mean, geom="point", shape=17, size=4) +
  coord_flip() +
  theme_light()

```

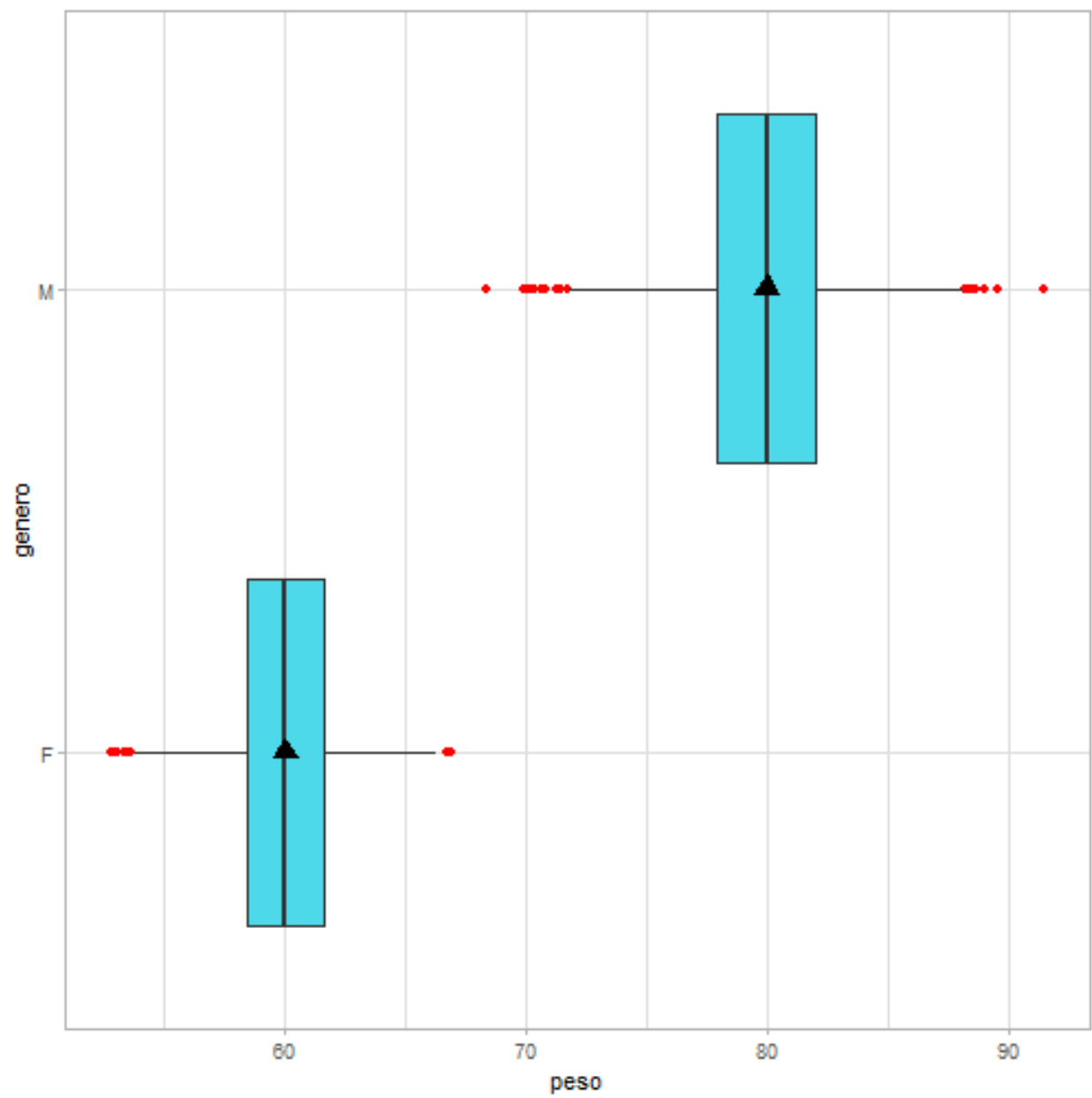


Figure 10: plot of chunk unnamed-chunk-1

```
## Altura
### Histograma
p6_breaks_al <- pretty(range(p6_alumnos$altura), n=nclass.Sturges((p6_alumnos$altura)), min.n=1)

ggplot(p6_alumnos, aes(x=altura)) +
  geom_histogram(breaks=p6_breaks_al, fill="#4DD9EA", color="#1D91C0") +
  xlab("Altura") + ylab("Cantidad de estudiantes") +
  labs(title="Histograma de altura", caption="Grupo 5")
```

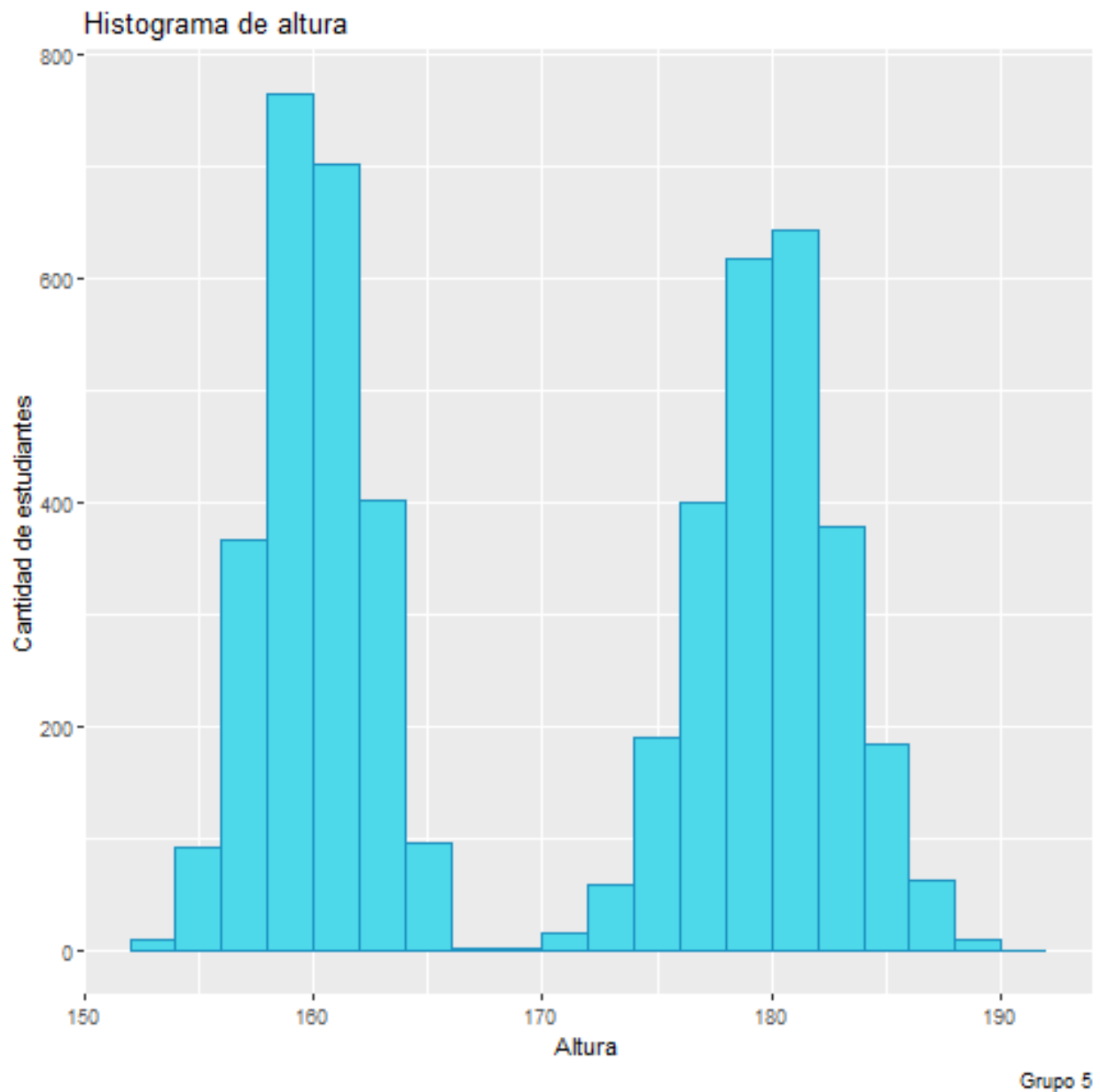


Figure 11: plot of chunk unnamed-chunk-1

```
theme_light()
```

```
## List of 93
```

```

## $ line :List of 6
## ..$ colour : chr "black"
## ..$ size : num 0.5
## ..$ linetype : num 1
## ..$ lineend : chr "butt"
## ..$ arrow : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ rect :List of 5
## ..$ fill : chr "white"
## ..$ colour : chr "black"
## ..$ size : num 0.5
## ..$ linetype : num 1
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ text :List of 11
## ..$ family : chr ""
## ..$ face : chr "plain"
## ..$ colour : chr "black"
## ..$ size : num 11
## ..$ hjust : num 0.5
## ..$ vjust : num 0.5
## ..$ angle : num 0
## ..$ lineheight : num 0.9
## ..$ margin : 'margin' num [1:4] 0points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ title : NULL
## $ aspect.ratio : NULL
## $ axis.title : NULL
## $ axis.title.x :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : num 1
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 2.75points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.top :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : num 0
## ..$ angle : NULL

```

```

## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 0points 0points 2.75points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.x.bottom : NULL
## $ axis.title.y :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : num 1
## ..$ angle : num 90
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 0points 2.75points 0points 0points
## .. ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.title.y.left : NULL
## $ axis.title.y.right :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : num 0
## ..$ angle : num -90
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 0points 0points 0points 2.75points
## .. ..- attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : chr "grey30"
## ..$ size : 'rel' num 0.8
## ..$ hjust : NULL
## ..$ vjust : NULL
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : NULL
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL

```



```

## ..$ hjust      : NULL
## ..$ vjust      : num 1
## ..$ angle      : NULL
## ..$ lineheight : NULL
## ..$ margin     : 'margin' num [1:4] 2.2points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug      : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.top      :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : NULL
## ..$ vjust            : num 0
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 0points 2.2points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.x.bottom   : NULL
## $ axis.text.y          :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : num 1
## ..$ vjust            : NULL
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 2.2points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.text.y.left     : NULL
## $ axis.text.y.right    :List of 11
## ..$ family           : NULL
## ..$ face             : NULL
## ..$ colour           : NULL
## ..$ size             : NULL
## ..$ hjust            : num 0
## ..$ vjust            : NULL
## ..$ angle            : NULL
## ..$ lineheight       : NULL
## ..$ margin           : 'margin' num [1:4] 0points 0points 0points 2.2points
## ..- attr(*, "unit")= int 8
## ..$ debug            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ axis.ticks           :List of 6

```

```

## ..$ colour      : chr "grey70"
## ..$ size        : 'rel' num 0.5
## ..$ linetype    : NULL
## ..$ lineend     : NULL
## ..$ arrow       : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ axis.ticks.x      : NULL
## $ axis.ticks.x.top  : NULL
## $ axis.ticks.x.bottom: NULL
## $ axis.ticks.y      : NULL
## $ axis.ticks.y.left : NULL
## $ axis.ticks.y.right: NULL
## $ axis.ticks.length : 'simpleUnit' num 2.75points
## ..- attr(*, "unit")= int 8
## $ axis.ticks.length.x : NULL
## $ axis.ticks.length.x.top : NULL
## $ axis.ticks.length.x.bottom: NULL
## $ axis.ticks.length.y : NULL
## $ axis.ticks.length.y.left : NULL
## $ axis.ticks.length.y.right : NULL
## $ axis.line          : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ axis.line.x        : NULL
## $ axis.line.x.top    : NULL
## $ axis.line.x.bottom : NULL
## $ axis.line.y        : NULL
## $ axis.line.y.left   : NULL
## $ axis.line.y.right  : NULL
## $ legend.background  :List of 5
## ..$ fill             : NULL
## ..$ colour           : logi NA
## ..$ size             : NULL
## ..$ linetype         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.margin      : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ legend.spacing     : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ legend.spacing.x   : NULL
## $ legend.spacing.y   : NULL
## $ legend.key         :List of 5
## ..$ fill             : chr "white"
## ..$ colour           : logi NA
## ..$ size             : NULL
## ..$ linetype         : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ legend.key.size    : 'simpleUnit' num 1.2lines
## ..- attr(*, "unit")= int 3
## $ legend.key.height  : NULL
## $ legend.key.width   : NULL
## $ legend.text        :List of 11

```

```

## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : 'rel' num 0.8
## ..$ hjust       : NULL
## ..$ vjust       : NULL
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.text.align      : NULL
## $ legend.title           :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : num 0
## ..$ vjust       : NULL
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ legend.title.align    : NULL
## $ legend.position       : chr "right"
## $ legend.direction      : NULL
## $ legend.justification  : chr "center"
## $ legend.box            : NULL
## $ legend.box.just       : NULL
## $ legend.box.margin     : 'margin' num [1:4] 0cm 0cm 0cm 0cm
## ..- attr(*, "unit")= int 1
## $ legend.box.background : list()
## ..- attr(*, "class")= chr [1:2] "element_blank" "element"
## $ legend.box.spacing    : 'simpleUnit' num 11points
## ..- attr(*, "unit")= int 8
## $ panel.background      :List of 5
## ..$ fill                : chr "white"
## ..$ colour              : logi NA
## ..$ size                : NULL
## ..$ linetype            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.border          :List of 5
## ..$ fill                : logi NA
## ..$ colour              : chr "grey70"
## ..$ size                : 'rel' num 1
## ..$ linetype            : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ panel.spacing        : 'simpleUnit' num 5.5points
## ..- attr(*, "unit")= int 8

```

```

## $ panel.spacing.x          : NULL
## $ panel.spacing.y          : NULL
## $ panel.grid                :List of 6
## ..$ colour                 : chr "grey87"
## ..$ size                    : NULL
## ..$ linetype                : NULL
## ..$ lineend                 : NULL
## ..$ arrow                   : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major          :List of 6
## ..$ colour                 : NULL
## ..$ size                    : 'rel' num 0.5
## ..$ linetype                : NULL
## ..$ lineend                 : NULL
## ..$ arrow                   : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.minor          :List of 6
## ..$ colour                 : NULL
## ..$ size                    : 'rel' num 0.25
## ..$ linetype                : NULL
## ..$ lineend                 : NULL
## ..$ arrow                   : logi FALSE
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_line" "element"
## $ panel.grid.major.x        : NULL
## $ panel.grid.major.y        : NULL
## $ panel.grid.minor.x        : NULL
## $ panel.grid.minor.y        : NULL
## $ panel.ontop                : logi FALSE
## $ plot.background            :List of 5
## ..$ fill                    : NULL
## ..$ colour                 : chr "white"
## ..$ size                    : NULL
## ..$ linetype                : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ plot.title                 :List of 11
## ..$ family                  : NULL
## ..$ face                    : NULL
## ..$ colour                  : NULL
## ..$ size                    : 'rel' num 1.2
## ..$ hjust                   : num 0
## ..$ vjust                   : num 1
## ..$ angle                   : NULL
## ..$ lineheight              : NULL
## ..$ margin                  : 'margin' num [1:4] 0points 0points 5.5points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug                   : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.title.position        : chr "panel"
## $ plot.subtitle              :List of 11

```

```

## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : NULL
## ..$ hjust       : num 0
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 0points 0points 5.5points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption   :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : 'rel' num 0.8
## ..$ hjust       : num 1
## ..$ vjust       : num 1
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : 'margin' num [1:4] 5.5points 0points 0points 0points
## ..- attr(*, "unit")= int 8
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.caption.position : chr "panel"
## $ plot.tag        :List of 11
## ..$ family      : NULL
## ..$ face        : NULL
## ..$ colour      : NULL
## ..$ size        : 'rel' num 1.2
## ..$ hjust       : num 0.5
## ..$ vjust       : num 0.5
## ..$ angle       : NULL
## ..$ lineheight  : NULL
## ..$ margin      : NULL
## ..$ debug       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_text" "element"
## $ plot.tag.position : chr "topleft"
## $ plot.margin       : 'margin' num [1:4] 5.5points 5.5points 5.5points 5.5points
## ..- attr(*, "unit")= int 8
## $ strip.background  :List of 5
## ..$ fill           : chr "grey70"
## ..$ colour         : logi NA
## ..$ size           : NULL
## ..$ linetype       : NULL
## ..$ inherit.blank: logi TRUE
## ..- attr(*, "class")= chr [1:2] "element_rect" "element"
## $ strip.background.x : NULL
## $ strip.background.y : NULL
## $ strip.placement    : chr "inside"

```

```
## $ strip.text :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : chr "white"
## ..$ size : 'rel' num 0.8
## ..$ hjust : NULL
## ..$ vjust : NULL
## ..$ angle : NULL
## ..$ lineheight : NULL
## ..$ margin : 'margin' num [1:4] 4.4points 4.4points 4.4points 4.4points
## ..$ attr(*, "unit")= int 8
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..$ attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.text.x : NULL
## $ strip.text.y :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : NULL
## ..$ angle : num -90
## ..$ lineheight : NULL
## ..$ margin : NULL
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..$ attr(*, "class")= chr [1:2] "element_text" "element"
## $ strip.switch.pad.grid : 'simpleUnit' num 2.75points
## ..$ attr(*, "unit")= int 8
## $ strip.switch.pad.wrap : 'simpleUnit' num 2.75points
## ..$ attr(*, "unit")= int 8
## $ strip.text.y.left :List of 11
## ..$ family : NULL
## ..$ face : NULL
## ..$ colour : NULL
## ..$ size : NULL
## ..$ hjust : NULL
## ..$ vjust : NULL
## ..$ angle : num 90
## ..$ lineheight : NULL
## ..$ margin : NULL
## ..$ debug : NULL
## ..$ inherit.blank: logi TRUE
## ..$ attr(*, "class")= chr [1:2] "element_text" "element"
## - attr(*, "class")= chr [1:2] "theme" "gg"
## - attr(*, "complete")= logi TRUE
## - attr(*, "validate")= logi TRUE
```

```
### Caja
```

```
ggplot(p6_alumnos, aes(x=genero, y=altura)) +
  geom_boxplot(outlier.colour = "red", fill="#4DD9EA") +
  stat_summary(fun=mean, geom="point", shape=17, size=4) +
  coord_flip() +
```

```
theme_light()
```

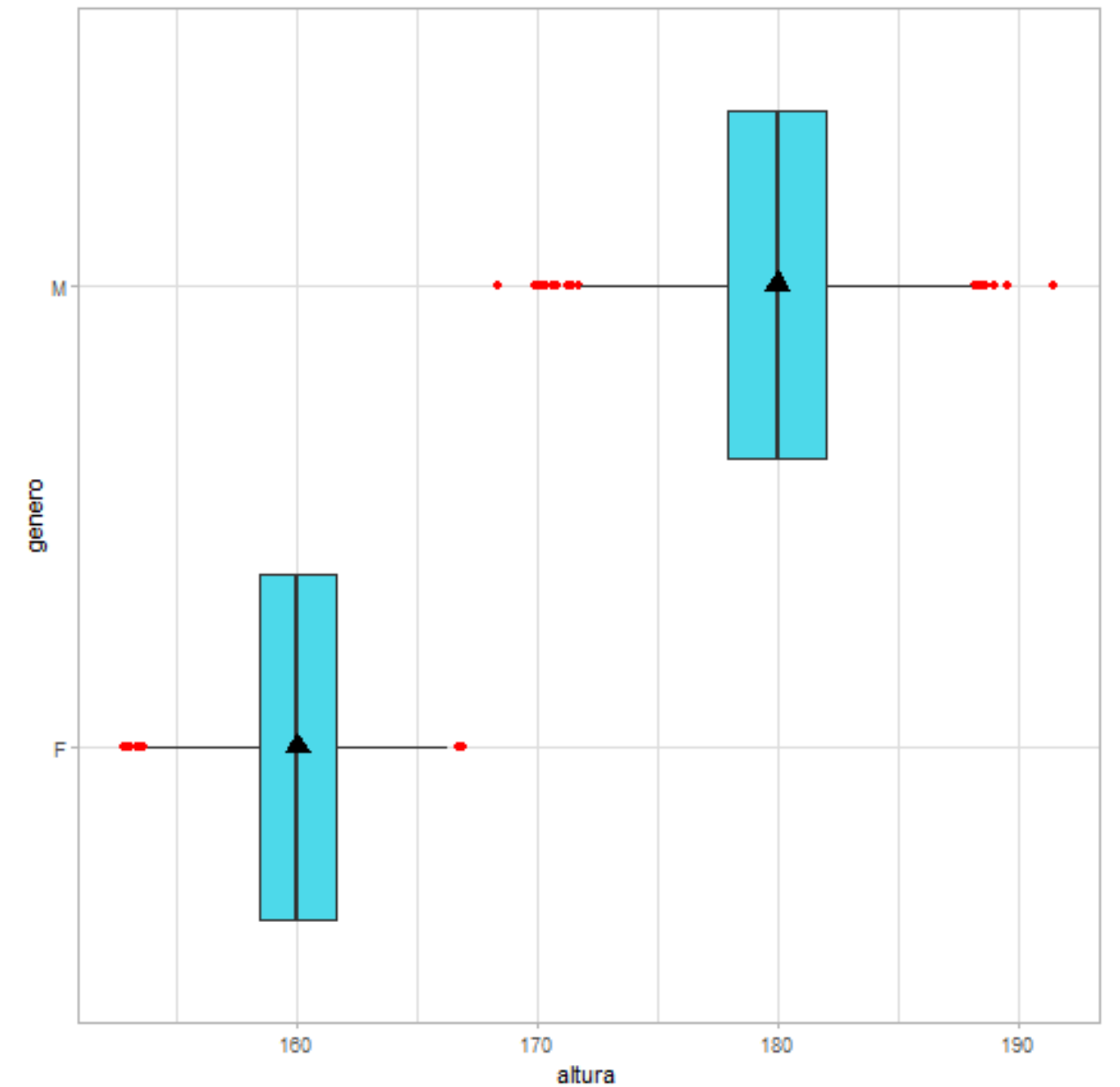


Figure 12: plot of chunk unnamed-chunk-1

```
# Punto 7: Medidas de tendencia central
p7_mean <- alumnos %>% select(promedio, edad, peso, altura) %>% summarise_all(funs(mean))
p7_median <- alumnos %>% select(promedio, edad, peso, altura) %>% summarise_all(funs(median))
p7_mfv_p = mfv(alumnos$peso)
p7_mfv_p_s = paste(c("M: ", p7_mfv_p[1], " H: ", p7_mfv_p[2]), collapse = " ")
p7_mfv_a = mfv(alumnos$altura)
p7_mfv_a_s = paste(c("M:", p7_mfv_a[1], " H:", p7_mfv_a[2]), collapse = " ")

p7_mfv <- alumnos %>% select(promedio, edad, peso, altura) %>%
```

```

summarise_at(c("promedio", "edad"), funs(mfv)) %>% mutate(peso = p7_mfv_p_s, altura = p7_mfv_a_s)

p7_sum <- data.frame(Variables = c("promedio", "edad", "peso", "altura"),
                     Promedio = as.vector(t(p7_mean)), Mediana = as.vector(t(p7_median)),
                     Moda = as.vector(t(p7_mfv)))
p7_ta = cbind(p7_sum)
p7_ta

```

```

##   Variables Promedio Mediana          Moda
## 1 promedio  85.98896  85.950          83.73
## 2   edad    21.00120  21.000           21
## 3   peso    70.23813  73.685 M:  60.41   H:  81.22
## 4  altura   170.23813 173.685 M: 160.41   H: 181.22

```

Punto 8: Medidas de variabilidad

```

rango <- function(a) {
  res <- range(a)[2]-range(a)[1]
  return(res)
}

p8_ra <- alumnos %>% select(promedio, edad, peso, altura) %>% summarise_all(funs(rango))
p8_var <- alumnos %>% select(promedio, edad, peso, altura) %>% summarise_all(funs(var))
p8_sd <- alumnos %>% select(promedio, edad, peso, altura) %>% summarise_all(funs(sd))
p8_cv <- alumnos %>% select(promedio, edad, peso, altura) %>% summarise_all(funs(cv))

p8_sum <- data.frame(Variables = c("promedio", "edad", "peso", "altura"),
                     Rango = as.vector(t(p8_ra)), Varianza = as.vector(t(p8_var)),
                     CVariacion = as.vector(t(p8_cv)))
p8_ta = cbind(p8_sum)
p8_ta

```

```

##   Variables Rango  Varianza CVariacion
## 1 promedio 25.92  12.649682 0.04136158
## 2   edad   8.00   1.127424 0.05055912
## 3   peso  38.69 107.272388 0.14745891
## 4  altura 38.69 107.272388 0.06083971

```

Punto 9: Posición relativa

```

qts = c(0.25,0.75,0.85,0.92)
p9_pr <- quantile(alumnos$promedio,qts)
p9_ed <- quantile(alumnos$edad,qts)
p9_pe <- quantile(alumnos$peso,qts)
p9_al <- quantile(alumnos$altura,qts)

p9_cb = cbind(p9_pr, p9_ed, p9_pe, p9_al)

p9_sum <- data.frame(Variables = c("promedio", "edad", "peso", "altura"),
                     ".25" = as.vector(t(p9_cb[1,])),
                     ".75" = as.vector(t(p9_cb[2,])),
                     ".85" = as.vector(t(p9_cb[3,])), ".92" = as.vector(t(p9_cb[4,])))
p9_ta = cbind(p9_sum)
p9_ta

```

```

##   Variables  X.25  X.75  X.85  X.92
## 1 promedio  83.68  88.42  89.71 90.9708

```



```
## 2      edad 20.00 22.00 22.00 22.0000
## 3      peso 60.05 80.10 81.65 83.1400
## 4      altura 160.05 180.10 181.65 183.1400

# Punto 10-11: Asimetría y apuntamiento
p10_asi <- alumnos %>% select(promedio, edad, peso, altura) %>% summarise_all(funs(skewness))
p10_apu <- alumnos %>% select(promedio, edad, peso, altura) %>% summarise_all(funs(kurtosis))

p10_sum <- data.frame(Variables = c("promedio", "edad", "peso", "altura"),
                      "Asimetria" = as.vector(t(p10_asi)),
                      "Apuntamiento" = as.vector(t(p10_apu)))

p10_ta = cbind(p10_sum)
p10_ta

## Variables Asimetria Apuntamiento
## 1 promedio -0.03993922 -0.0429190845
## 2      edad -0.06553991 -0.0000692884
## 3      peso  0.01524525 -1.7288749805
## 4      altura 0.01524525 -1.7288749805

###
summary(alumnos)

## matricula      carrera      Estrato      genero      promedio      edad      peso
## Min. : 1 ARQUITECTURA: 421 Min. :1.000 F:2436 Min. :73.28 Min. :17 Min. :52
## 1st Qu.:1251 QUIMICA : 415 1st Qu.:2.000 M:2564 1st Qu.:83.68 1st Qu.:20 1st Qu.:60
## Median :2500 ELECTRICA : 407 Median :4.000 Median :85.95 Median :21 Median :73
## Mean :2500 ELECTRONICA : 403 Mean :3.538 Mean :85.99 Mean :21 Mean :70
## 3rd Qu.:3750 TIC : 401 3rd Qu.:5.000 3rd Qu.:88.42 3rd Qu.:22 3rd Qu.:80
## Max. :5000 SISTEMAS : 397 Max. :6.000 Max. :99.20 Max. :25 Max. :91
## (Other) :2556

## altura
## Min. :152.8
## 1st Qu.:160.1
## Median :173.7
## Mean :170.2
## 3rd Qu.:180.1
## Max. :191.5
##
```