3

```r
#
library(tidyverse) #
library(magrittr) #
library(stargazer)
library(gtsummary)
```

$= 0, \quad = 1$

1000 2 2000

-

  –

- id:
- class:
- gender:
- test:
- hometown:

```
data3 <- read_csv("data3.csv")
data3
```

```
# A tibble: 30 x 5
      id class gender  test hometown
   <dbl> <dbl> <chr>  <dbl> <chr>
 1     1     1         100
 2     2     1          20
 3     3     1          60
 4     4     1          80
```

```
 5     5     1          40
 6     6     1          90
 7     7     1          30
 8     8     1          60
 9     9     1          90
10    10     1          30
# i 20 more rows
```

R

r

- numeric (num)
- character (chr)
- factor (fctr)
- logical (lgl) true false 2

csv R Environment Data str( )

```
str(data3)
```

```
spc_tbl_ [30 x 5] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
 $ id      : num [1:30] 1 2 3 4 5 6 7 8 9 10 ...
 $ class   : num [1:30] 1 1 1 1 1 1 1 1 1 1 ...
 $ gender  : chr [1:30] " " " " " " " " ...
 $ test    : num [1:30] 100 20 60 80 40 90 30 60 90 30 ...
 $ hometown: chr [1:30] " " " " " " " " " ...
 - attr(*, "spec")=
  .. cols(
  ..   id = col_double(),
  ..   class = col_double(),
  ..   gender = col_character(),
  ..   test = col_double(),
  ..   hometown = col_character()
  .. )
 - attr(*, "problems")=<externalptr>
```

gender hometown chr num id class

class as.factor( )

```
data3 %<>%
  mutate(class = as.factor(class))
```

1

`data3 <- data3 |>`

2 `mutate(    =  )` class class

$$X_i = X_1, X_2, ...X_n$$

$\bar{X}$

$$\bar{X} = (X_1 + X_2 + ...X_n)/n = \frac{1}{n}\Sigma_{i=1}^{n} X_i$$

```r
data3_1 <- c(100,90,80,70,60,40,10) #<1>
xbar <- mean(data3_1)
xbar

#
xbar2 = sum(data3_1) / length(data3_1) #<2>
xbar2
```

① data3_1
② sum() () length() data3_1 7 7

```
[1] 64.28571
[1] 64.28571
```

```
median(data3_1)
```

```
[1] 70
```

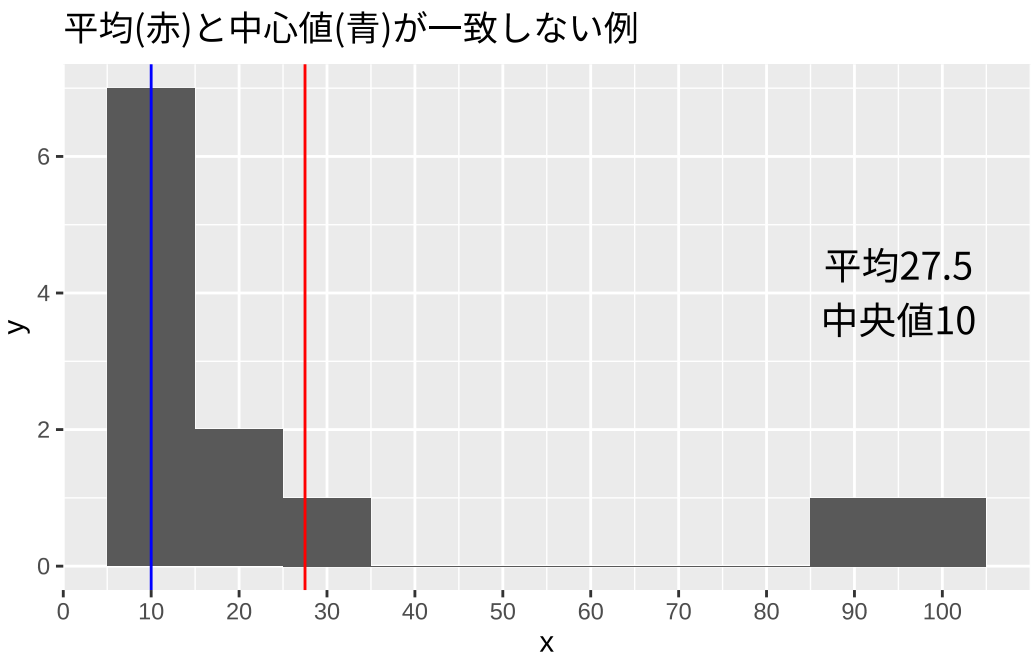
```
x <- c(10, 10, 10, 10, 10, 10, 10, 20, 20, 30, 90, 100)
```

```
mean(x)
```

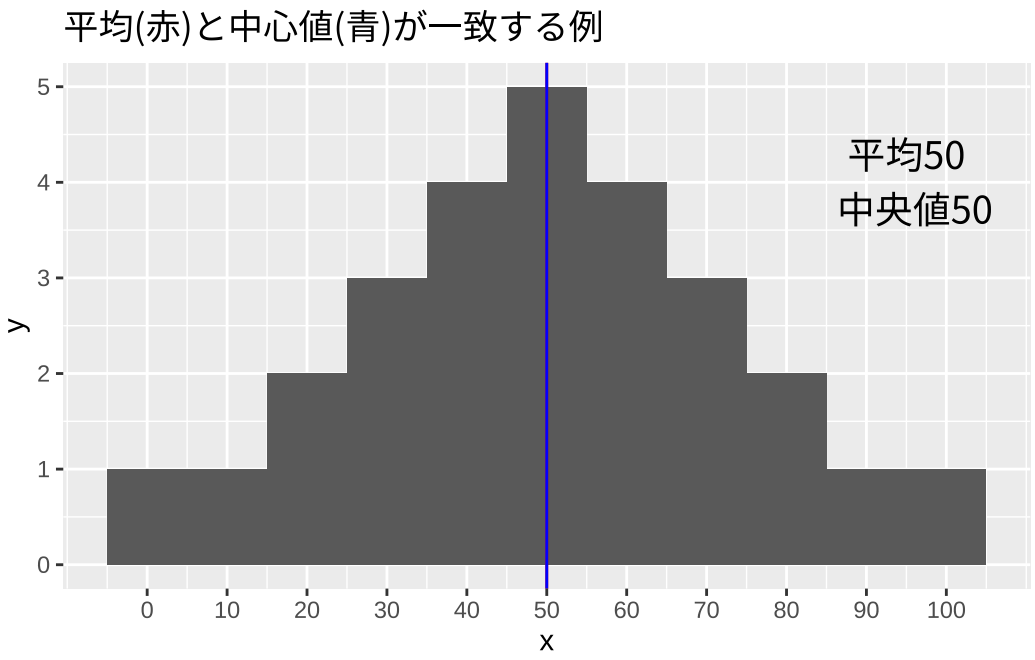
```
[1] 27.5
```

```
median(x)
```

```
[1] 10
```



```
# A tibble: 27 x 1
   value
   <dbl>
 1     0
 2    10
 3    20
 4    20
 5    30
 6    30
 7    30
 8    40
 9    40
10    40
# i 17 more rows
```




```
max(data3_1)
```

```
[1] 100
```

```
min(data3_1)
```

```
[1] 10
```

A, B 60

A. 20,60,100,30,90
B. 60,60,60,60,60

$\bar{X} - X_i$ 0 2 $(\bar{X} - X_i)^2$

$$= \frac{1}{n}\Sigma_{i=1}^{n}(\bar{X} - X_i)^2$$

```
data3_2a <- c(20,60,100,30,90)
data3_2b <- c(60,60,60,60,60)

meana <- mean(data3_2a)
sa <- meana -  data3_2a
sua <- sum(sa^2)
 a <- sua / length(data3_2a) #<1>

 b = sum((mean(data3_2b) - data3_2b)^2)/length(data3_2b)

 a
 b
```

①

```
[1] 1000
[1] 0
```

A 1000 B 0

100 2

$$= \sqrt{}$$

```
A <- sqrt( a)
A
```

```
[1] 31.62278
```

```
table(data3$hometown)

data3 %>%
  select(.,hometown) %>% #<1>
  tbl_summary(., #<2>
              label = list(hometown ~ ""),
              sort = list(everything() ~ "frequency")
              ) %>%
  modify_header(label = "")
```

① select()　　(hometown)
② tbl_summary()

```
Table printed with `knitr::kable()`, not {gt}. Learn why at
https://www.danieldsjoberg.com/gtsummary/articles/rmarkdown.html
To suppress this message, include `message = FALSE` in code chunk header.
```

```
     7      6      1     10      3      1      2
```

N = 30
10 (33%)
7 (23%)
6 (20%)

N = 30
3 (10%)
2 (6.7%)
1 (3.3%)
1 (3.3%)

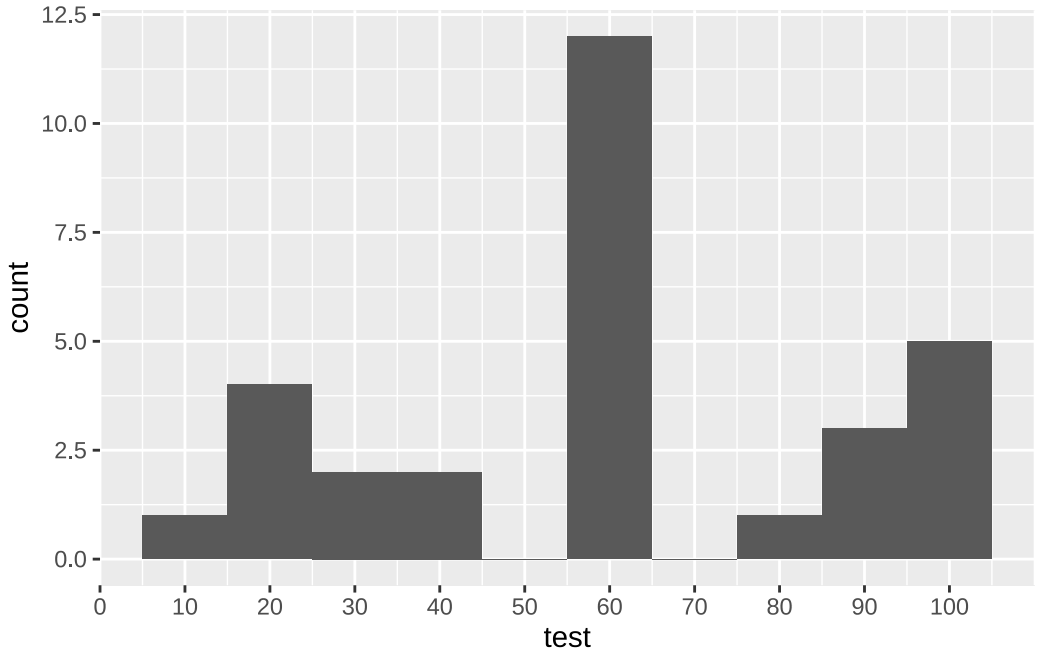
```
data3 %$%
  hist(test,
       breaks = seq(5,105,10),  #<1>
       xaxt = "n"  #<2>
       )
axis(1, at = 10*(0:100))  #<3>
```

① 10
②
③ 100 10

`ggplot2` (`tidyverse`) ggplot

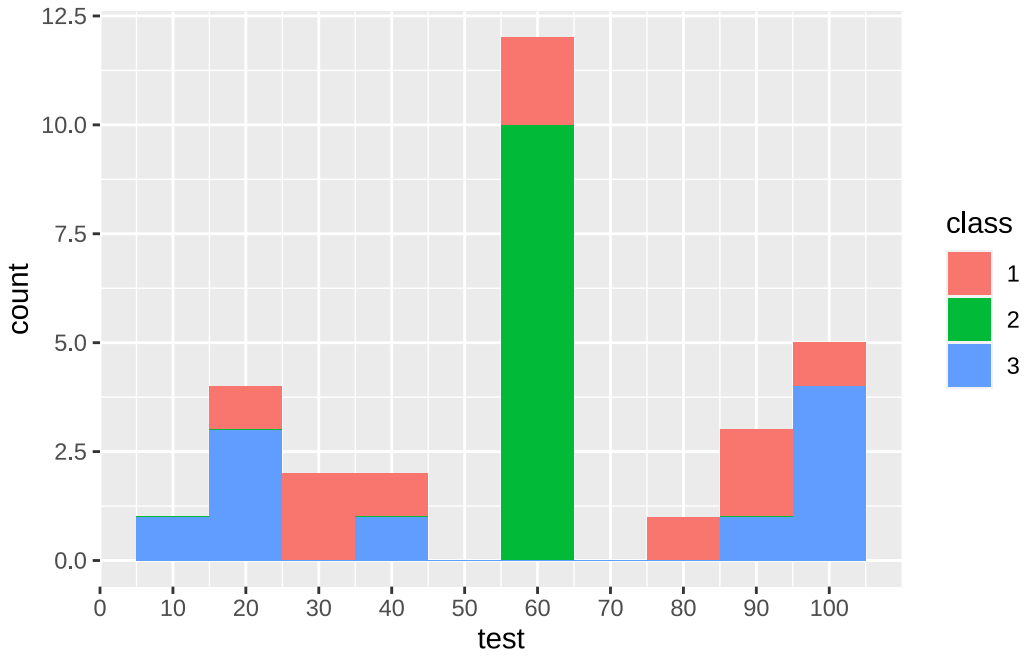
```
data3 %$%
  ggplot(., aes(test)) + #<1>
  geom_histogram(breaks = seq(5,105,10)) + #<2>
  scale_x_continuous(breaks=seq(0,100,10))  #<3>
```

① x
② 10
③ (10)



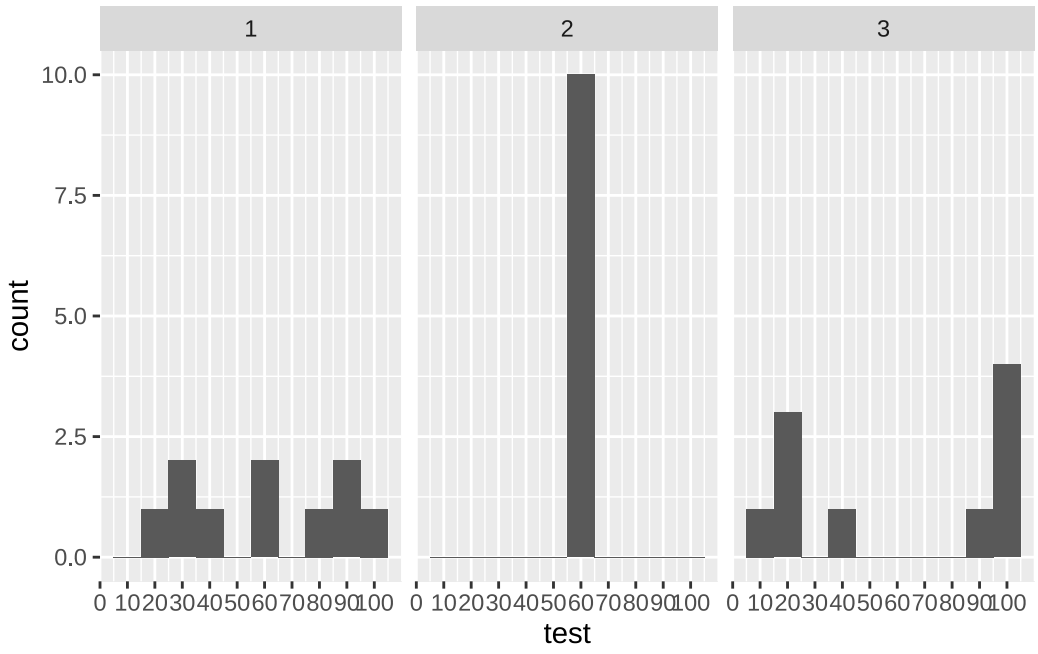

```
data3 %>%
  ggplot(., aes(test, fill = class)) + #<1>
  geom_histogram(breaks = seq(5,105,10)) +
  scale_x_continuous(breaks=seq(0,100,10))
```

① fill




```
data3 %$%
  ggplot(., aes(test)) +
  geom_histogram(breaks = seq(5,105,10)) +
  scale_x_continuous(breaks=seq(0,100,10)) +
  facet_grid(~class) #<1>
```

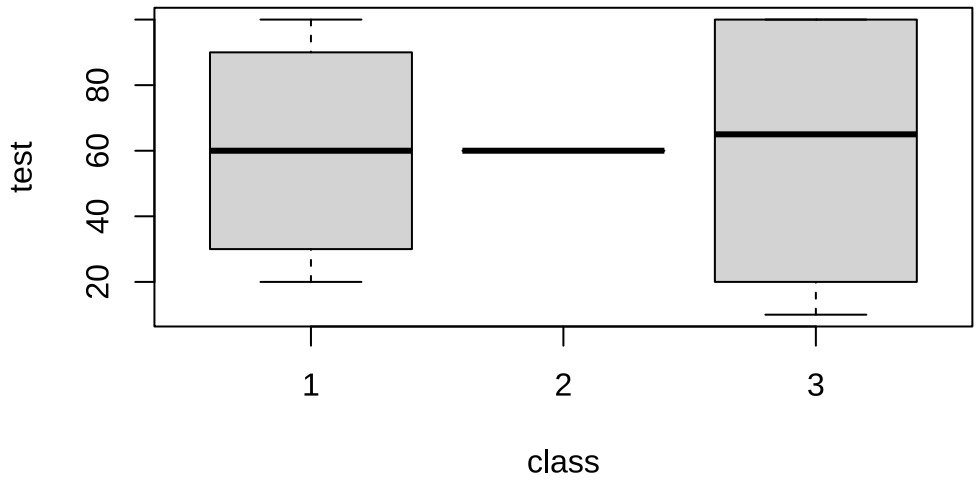
① class



60 3

```
data3 %$%
  boxplot(test~class) #<1>
```

① boxplot() () (~)



- 75 25 4 1
- 2 60

```
par(family= "jp")
data3 %$%
  boxplot(test~gender)
```