20BDS0033
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Lab Assignment Visualization

Code:

```
#1. Plot Function
x <- iris
x
plot(x$Sepal.Length, x$Sepal.Width)


#2. Various Types
#  a. Scatter
plot(x$Sepal.Length, x$Sepal.Width, main="Scatterplot")

#  b. Bar
plot(table(x$Sepal.Length), main="Barplot")

#  c. Box
boxplot(x$Sepal.Length ~ x$Sepal.Width)

#  d. Plot a function
library(tidyverse)
f2 <- function(x) {
  ifelse(x<0, -x, x)
}

ggplot(data.frame(x=c(-5,5)), aes(x=x)) + stat_function(fun=f2)

#  e. Correlation
library("ggpubr")
cor(x$Sepal.Length, x$Sepal.Width, method = "pearson")
ggscatter(x, x = "Sepal.Length", y = "Sepal.Width",
          add = "reg.line", conf.int = TRUE,
          cor.coef = TRUE, cor.method = "pearson",
          xlab = "Sepal Length", ylab = "Sepal Width")

#3. Plot a graph in new window - windows()
z <- c(1,2,3,4,5)
y <- c(6,7,8,9,10)

plot(x,y)
```

```
windows()

plot(x,y)

#4. Customize plots
#   a. type - l,s,p,o,b,h
j <- 1:20
k <- j
par(mfrow = c(1, 3))
plot(j, k, type = "l", main = "type = 'l'")
plot(j, k, type = "s", main = "type = 's'")
plot(j, k, type = "p", main = "type = 'p'")
par(mfrow = c(1, 1))
par(mfrow = c(1, 3))
plot(j, k, type = "o", main = "type = 'o'")
plot(j, k, type = "b", main = "type = 'b'")
plot(j, k, type = "h", main = "type = 'h'")
par(mfrow = c(1, 1))

#  b. pch - 1:25

r <- c(sapply(seq(5, 25, 5), function(i) rep(i, 5)))
t <- rep(seq(25, 5, -5), 5)
plot(r, t, pch = 1:25, cex = 3, yaxt = "n", xaxt = "n",
    ann = FALSE, xlim = c(3, 27), lwd = 1:3)
text(r - 1.5, t, 1:25)

plot(r, t, pch = 1:25, cex = 3, yaxt = "n", xaxt = "n", lwd = 3,
    ann = FALSE, xlim = c(3, 27), bg = 1:25, col = rainbow(25))
#  c. bg
#  d. col
#  e. cex
#  f. lwd
x <- c(1, 2, 3, 4, 5)
y <- c(3, 7, 8, 9, 12)
plot(x, y, pch = 21,
    bg = "red", # Fill color
    col = "blue", # Border color
    cex = 3, # Symbol size
    lwd = 3) # Border width
#  g. title
x <- c(1, 2, 3, 4, 5)
y <- c(3, 7, 8, 9, 12)
plot(x, y, main = "My title")
```

```
#  h. sub
x <- c(1, 2, 3, 4, 5)
y <- c(3, 7, 8, 9, 12)
plot(x, y, main = "My title", sub = "My subtitle")
#  i. xlab
#   j. ylab
x <- c(1, 2, 3, 4, 5)
y <- c(3, 7, 8, 9, 12)
plot(x, y, xlab = "My X label", ylab = "My Y label")
#  k. Remove axis
plot(x, y, xlab = "My X label", ylab = "My Y label", ann = FALSE)
#  l. Add axis
x <- c(1, 2, 3, 4, 5)
y <- c(3, 7, 8, 9, 12)
plot(x, y, axes = FALSE)
# Add X-axis
axis(1)
# Add Y-axis
axis(2)
# Add top-axis
axis(3)
# Add right-axis
axis(4)
# m. Axis tick
par(mfrow = c(1, 5))
# Axis ticks
plot(x, y, axes = FALSE, main = "Axis ticks")
axis(1, at = -5:5)
# Interior ticks
plot(x, y, tck = 0.02, main = "Interior ticks")
# Remove X axis tick labels
plot(x, y, xaxt = "n", main = "xaxt = 'n'")
# Remove Y axis tick labels
plot(x, y, yaxt = "n", main = "yaxt = 'n'")
# Remove both axis tick labels
plot(x, y, yaxt = "n", xaxt = "n", main = "xaxt = 'n', yaxt = 'n'")
par(mfrow = c(1, 1))

#  n, Axis range
x <- c(1, 2, 3, 4, 5)
y <- c(3, 7, 8, 9, 12)
plot(x, y,
    ylim = c(-15, 15), # Y-axis limits from -15 to 15
```

```
    xlim = c(-10, 10)) # X-axis limits from -5 to 5

#  o. Plot font
plot(x, y, main = "My title", sub = "Subtitle",
    font.main = 1, cex.main = 2, # Title font, size
    font.sub = 2, cex.sub = 1.5, # Subtitle font. size
    font.lab = 3, cex.lab = 3, # X-axis and Y-axis labels font, size
    font.axis = 4, cex.axis = 0.5) # Axis labels font, size
# p. Label point
attach(USJudgeRatings)
# Create the plot
plot(FAMI, INTG,
    main = "Familiarity with law vs Judicial integrity",
    xlab = "Familiarity", ylab = "Integrity",
    pch = 18, col = "blue")
# Plot the labels
text(FAMI, INTG,
    labels = row.names(USJudgeRatings),
    cex = 0.6, pos = 4, col = "red")
detach(USJudgeRatings)
#  q. Plot legend
plot(x, y, pch = 19)
lines(-4:4, -4:4, lwd = 3, col = "red")
lines(-4:1, 0:5, lwd = 3, col = "green")
# Adding a legend
legend("bottomright", legend = c("red", "green"),
       lwd = 3, col = c("red", "green"))
```

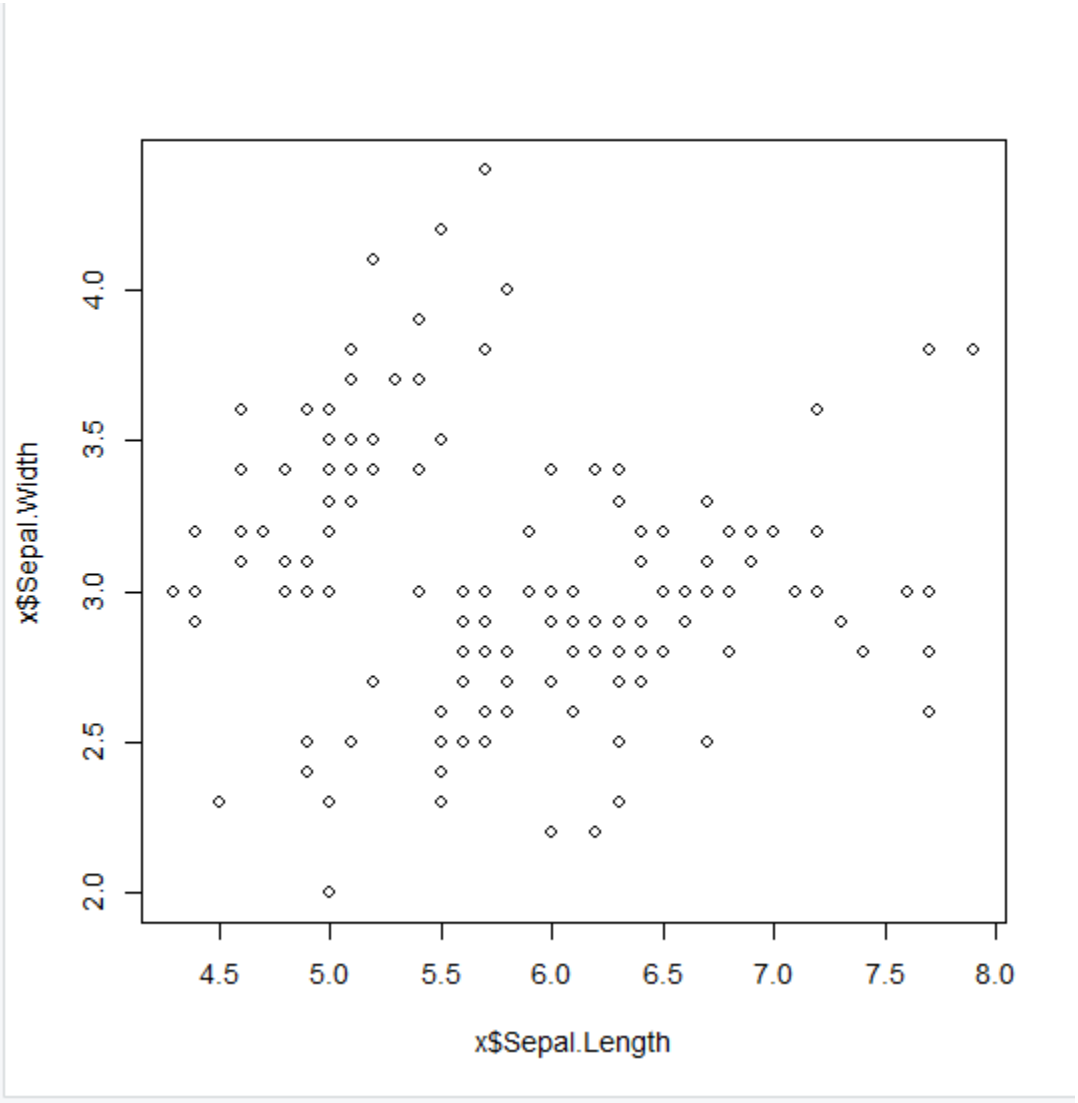
Screenshot:

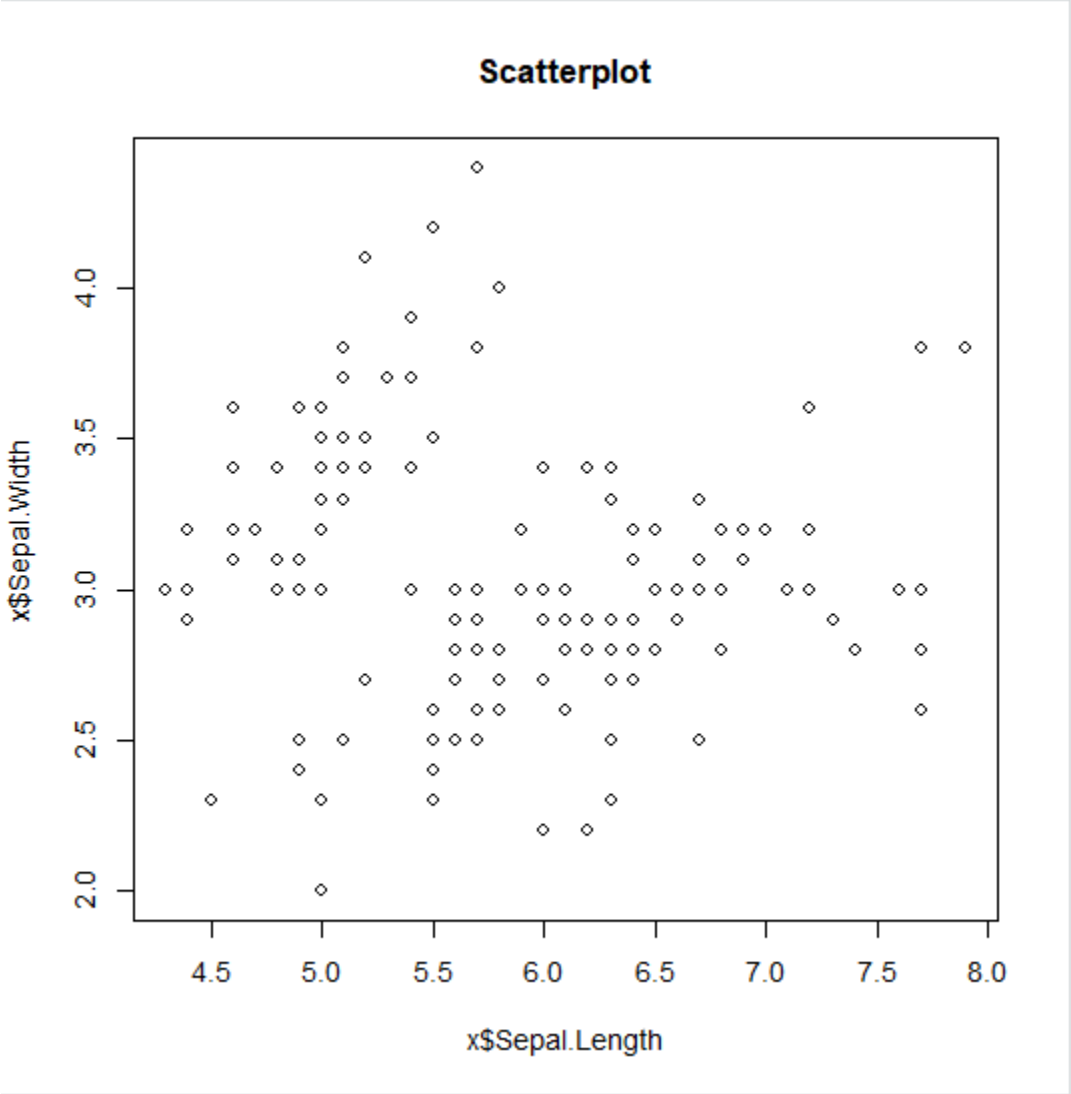
```
> #1. Plot Function
> x <- iris
> x
    Sepal.Length Sepal.Width Petal.Length Petal.Width    Species
1            5.1         3.5          1.4         0.2     setosa
2            4.9         3.0          1.4         0.2     setosa
3            4.7         3.2          1.3         0.2     setosa
4            4.6         3.1          1.5         0.2     setosa
5            5.0         3.6          1.4         0.2     setosa
6            5.4         3.9          1.7         0.4     setosa
7            4.6         3.4          1.4         0.3     setosa
8            5.0         3.4          1.5         0.2     setosa
9            4.4         2.9          1.4         0.2     setosa
10           4.9         3.1          1.5         0.1     setosa
11           5.4         3.7          1.5         0.2     setosa
12           4.8         3.4          1.6         0.2     setosa
13           4.8         3.0          1.4         0.1     setosa
14           4.3         3.0          1.1         0.1     setosa
15           5.8         4.0          1.2         0.2     setosa
16           5.7         4.4          1.5         0.4     setosa
17           5.4         3.9          1.3         0.4     setosa
18           5.1         3.5          1.4         0.3     setosa
19           5.7         3.8          1.7         0.3     setosa
20           5.1         3.8          1.5         0.3     setosa
21           5.4         3.4          1.7         0.2     setosa
22           5.1         3.7          1.5         0.4     setosa
23           4.6         3.6          1.0         0.2     setosa
24           5.1         3.3          1.7         0.5     setosa
25           4.8         3.4          1.9         0.2     setosa
26           5.0         3.0          1.6         0.2     setosa
27           5.0         3.4          1.6         0.4     setosa
28           5.2         3.5          1.5         0.2     setosa
29           5.2         3.4          1.4         0.2     setosa
30           4.7         3.2          1.6         0.2     setosa
31           4.8         3.1          1.6         0.2     setosa
32           5.4         3.4          1.5         0.4     setosa
33           5.2         4.1          1.5         0.1     setosa
34           5.5         4.2          1.4         0.2     setosa
35           4.9         3.1          1.5         0.2     setosa
36           5.0         3.2          1.2         0.2     setosa
37           5.5         3.5          1.3         0.2     setosa
38           4.9         3.6          1.4         0.1     setosa
```

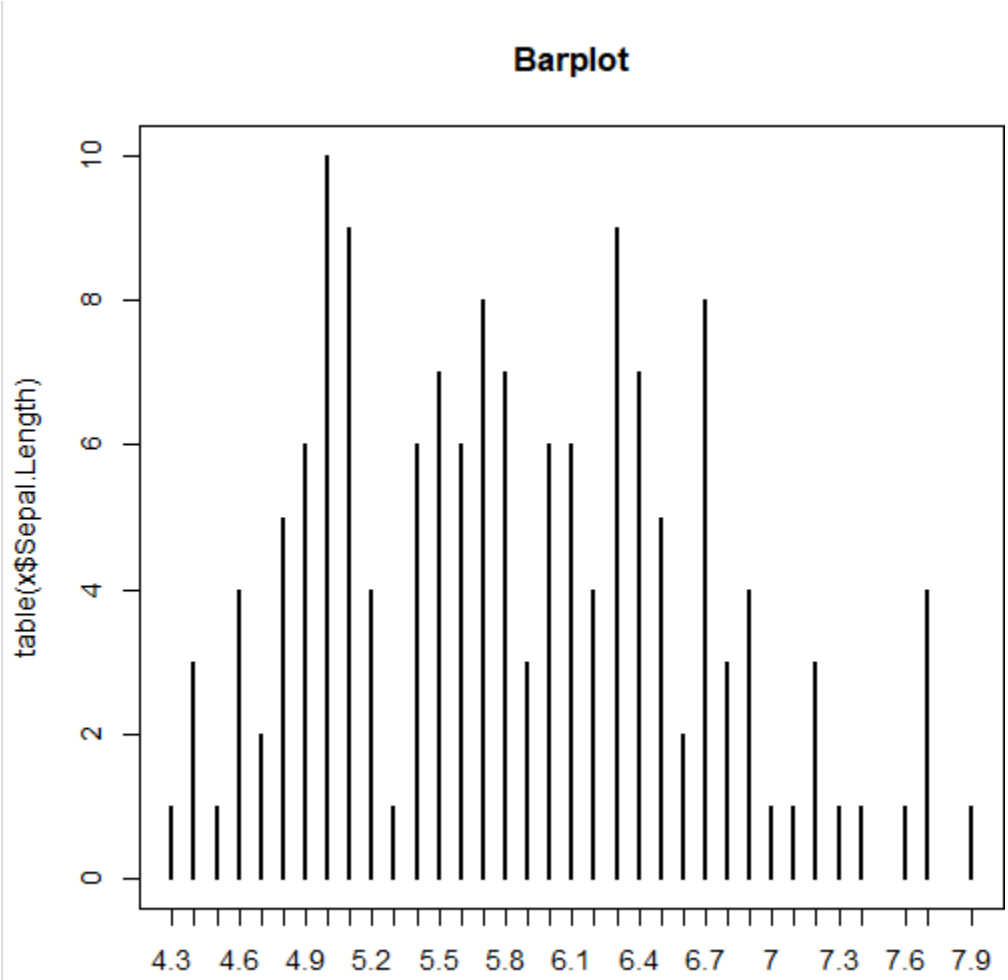
```
> plot(x$Sepal.Length, x$Sepal.Width)
> #2. Various Types
> #   a. Scatter
> plot(x$Sepal.Length, x$Sepal.Width, main="Scatterplot")
> #   b. Bar
> plot(table(x$Sepal.Length), main="Barplot")
> #   c. Box
> boxplot(x$Sepal.Length ~ x$Sepal.Width)
> #   d. Plot a function
> library(tidyverse)
-- Attaching packages --------------------------------------------------------------------------------------------------------- tidyverse 1.3.1 --
â˜ ggplot2 3.3.5     â˜ purrr   0.3.4
â˜ tibble  3.1.8     â˜ dplyr   1.0.9
â˜ tidyr   1.2.0     â˜ stringr 1.4.0
â˜ readr   2.1.2     â˜ forcats 0.5.1
-- Conflicts ------------------------------------------------------------------------------------------------------------ tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
Warning messages:
1: package 'tidyverse' was built under R version 4.1.3
2: package 'ggplot2' was built under R version 4.1.3
3: package 'tibble' was built under R version 4.1.3
4: package 'tidyr' was built under R version 4.1.3
5: package 'readr' was built under R version 4.1.3
6: package 'purrr' was built under R version 4.1.3
7: package 'dplyr' was built under R version 4.1.3
8: package 'stringr' was built under R version 4.1.3
9: package 'forcats' was built under R version 4.1.3
> f2 <- function(x) {
+   ifelse(x<0, -x, x)
+ }
> ggplot(data.frame(x=c(-5,5)), aes(x=x)) + stat_function(fun=f2)
> #   e. Correlation
> library("ggpubr")
Warning message:
package 'ggpubr' was built under R version 4.1.3
> cor(x$Sepal.Length, x$Sepal.Width, method = "pearson")
[1] -0.1175698
> ggscatter(x, x = "Sepal.Length", y = "Sepal.Width",
+           add = "reg.line", conf.int = TRUE,
+           cor.coef = TRUE, cor.method = "pearson",
+           xlab = "Sepal Length", ylab = "Sepal Width")
`geom_smooth()` using formula 'y ~ x'
> #3. Plot a graph in new window - windows()
> z <- c(1,2,3,4,5)
> y <- c(6,7,8,9,10)
> plot(x,y)
> windows()
> plot(x,y)
> #4. Customize plots
> #   a. type - l,s,p,o,b,h
> j <- 1:20
> k <- j
> par(mfrow = c(1, 3))
> plot(j, k, type = "l", main = "type = 'l'")
> plot(j, k, type = "s", main = "type = 's'")
> plot(j, k, type = "p", main = "type = 'p'")
> par(mfrow = c(1, 1))
> par(mfrow = c(1, 3))
> plot(j, k, type = "o", main = "type = 'o'")
> plot(j, k, type = "b", main = "type = 'b'")
> plot(j, k, type = "h", main = "type = 'h'")
```

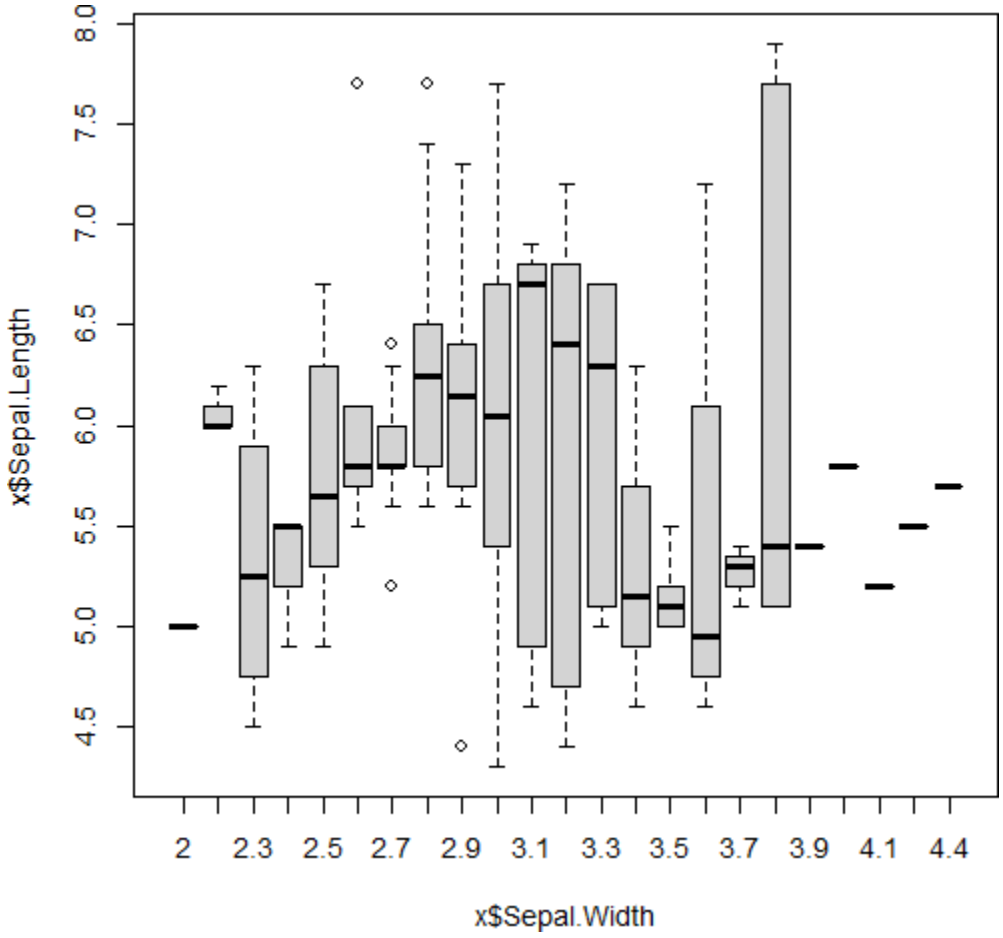
```
+      ann = FALSE, xlim = c(3, 27), bg = 1:25, col = rainbow(25))
> #   c. bg
> #   d. col
> #   e. cex
> #   f. lwd
> x <- c(1, 2, 3, 4, 5)
> y <- c(3, 7, 8, 9, 12)
> plot(x, y, pch = 21,
+      bg = "red", # Fill color
+      col = "blue", # Border color
+      cex = 3, # Symbol size
+      lwd = 3) # Border width
> #   g. title
> x <- c(1, 2, 3, 4, 5)
> y <- c(3, 7, 8, 9, 12)
> plot(x, y, main = "My title")
> #   h. sub
> x <- c(1, 2, 3, 4, 5)
> y <- c(3, 7, 8, 9, 12)
> plot(x, y, main = "My title", sub = "My subtitle")
> #   i. xlab
> #   j. ylab
> x <- c(1, 2, 3, 4, 5)
> y <- c(3, 7, 8, 9, 12)
> plot(x, y, xlab = "My X label", ylab = "My Y label")
> #   k. Remove axis
> plot(x, y, xlab = "My X label", ylab = "My Y label", ann = FALSE)
> #   l. Add axis
> x <- c(1, 2, 3, 4, 5)
> y <- c(3, 7, 8, 9, 12)
> plot(x, y, axes = FALSE)
> # Add X-axis
> axis(1)
> # Add Y-axis
> axis(2)
> # Add top-axis
> axis(3)
> # Add right-axis
> axis(4)
> #   m. Axis tick
> par(mfrow = c(1, 5))
> # Axis ticks
> plot(x, y, axes = FALSE, main = "Axis ticks")
> axis(1, at = -5:5)
> # Interior ticks
> plot(x, y, tck = 0.02, main = "Interior ticks")
> # Remove X axis tick labels
> plot(x, y, xaxt = "n", main = "xaxt = 'n'")
> # Remove Y axis tick labels
> plot(x, y, yaxt = "n", main = "yaxt = 'n'")
> # Remove both axis tick labels
> plot(x, y, yaxt = "n", xaxt = "n", main = "xaxt = 'n', yaxt = 'n'")
> par(mfrow = c(1, 1))
> #   n, Axis range
> x <- c(1, 2, 3, 4, 5)
> y <- c(3, 7, 8, 9, 12)
> plot(x, y,
+      ylim = c(-15, 15), # Y-axis limits from -15 to 15
+      xlim = c(-10, 10)) # X-axis limits from -5 to 5
> #   o. Plot font
> plot(x, y, main = "My title", sub = "Subtitle",
+      font.main = 1, cex.main = 2, # Title font, size
```

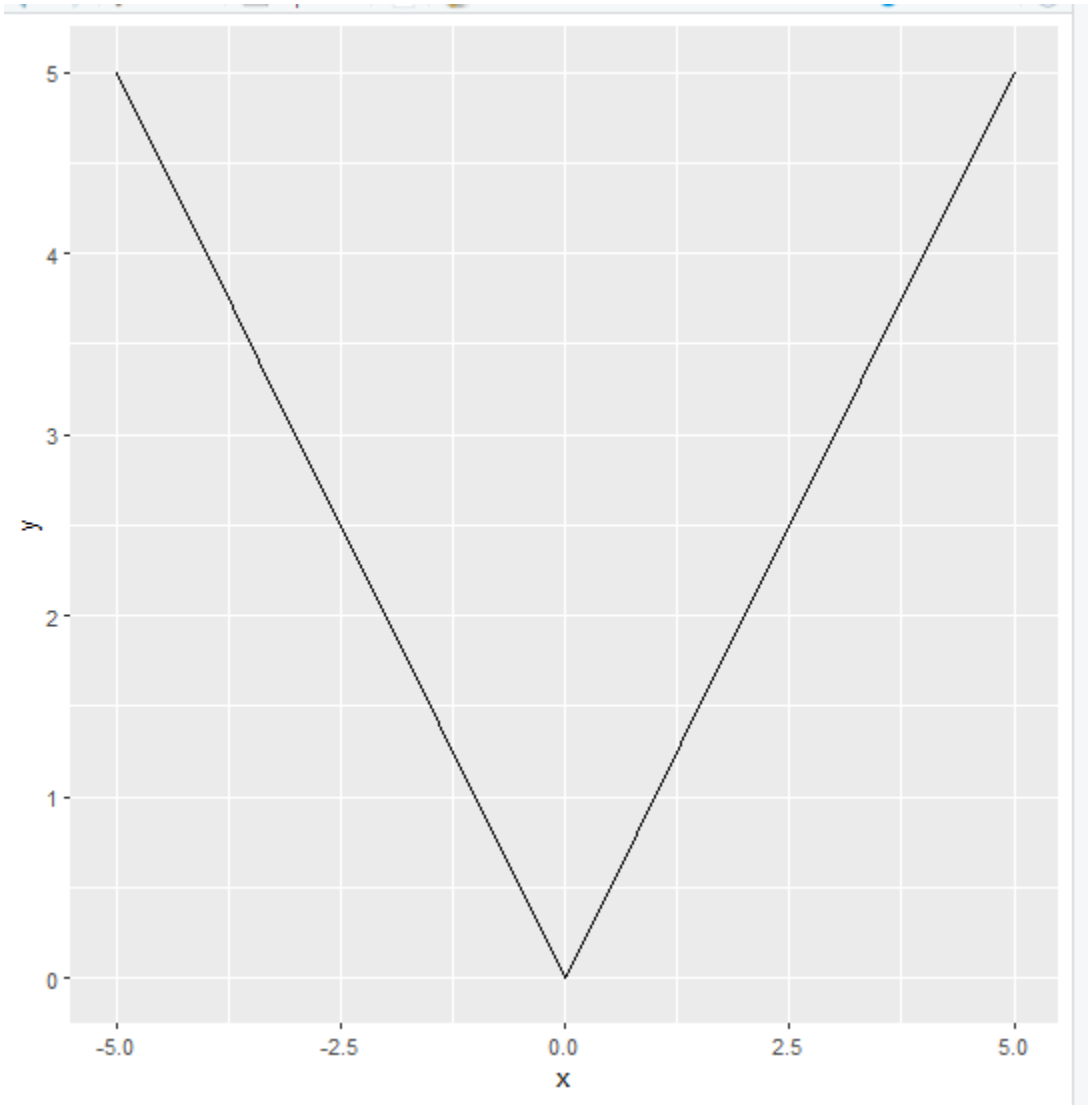
```
> # Interior ticks
> plot(x, y, tck = 0.02, main = "Interior ticks")
> # Remove X axis tick labels
> plot(x, y, xaxt = "n", main = "xaxt = 'n'")
> # Remove Y axis tick labels
> plot(x, y, yaxt = "n", main = "yaxt = 'n'")
> # Remove both axis tick labels
> plot(x, y, yaxt = "n", xaxt = "n", main = "xaxt = 'n', yaxt = 'n'")
> par(mfrow = c(1, 1))
> #   n, Axis range
> x <- c(1, 2, 3, 4, 5)
> y <- c(3, 7, 8, 9, 12)
> plot(x, y,
+      ylim = c(-15, 15), # Y-axis limits from -15 to 15
+      xlim = c(-10, 10)) # X-axis limits from -5 to 5
> #   o. Plot font
> plot(x, y, main = "My title", sub = "Subtitle",
+      font.main = 1, cex.main = 2, # Title font, size
+      font.sub = 2, cex.sub = 1.5, # Subtitle font. size
+      font.lab = 3, cex.lab = 3, # X-axis and Y-axis labels font, size
+      font.axis = 4, cex.axis = 0.5) # Axis labels font, size
> #   p. Label point
> attach(USJudgeRatings)
> # Create the plot
> plot(FAMI, INTG,
+      main = "Familiarity with law vs Judicial integrity",
+      xlab = "Familiarity", ylab = "Integrity",
+      pch = 18, col = "blue")
> # Plot the labels
> text(FAMI, INTG,
+      labels = row.names(USJudgeRatings),
+      cex = 0.6, pos = 4, col = "red")
> detach(USJudgeRatings)
> #   q. Plot legend
> plot(x, y, pch = 19)
> lines(-4:4, -4:4, lwd = 3, col = "red")
> lines(-4:1, 0:5, lwd = 3, col = "green")
> # Adding a legend
> legend("bottomright", legend = c("red", "green"),
+        lwd = 3, col = c("red", "green"))
>
>
>
>
>
>
>
>
>
> #   p. Label point
> attach(USJudgeRatings)
> # Create the plot
> plot(FAMI, INTG,
+      main = "Familiarity with law vs Judicial integrity",
+      xlab = "Familiarity", ylab = "Integrity",
+      pch = 18, col = "blue")
> # Plot the labels
> text(FAMI, INTG,
+      labels = row.names(USJudgeRatings),
+      cex = 0.6, pos = 4, col = "red")
> detach(USJudgeRatings)
>
```

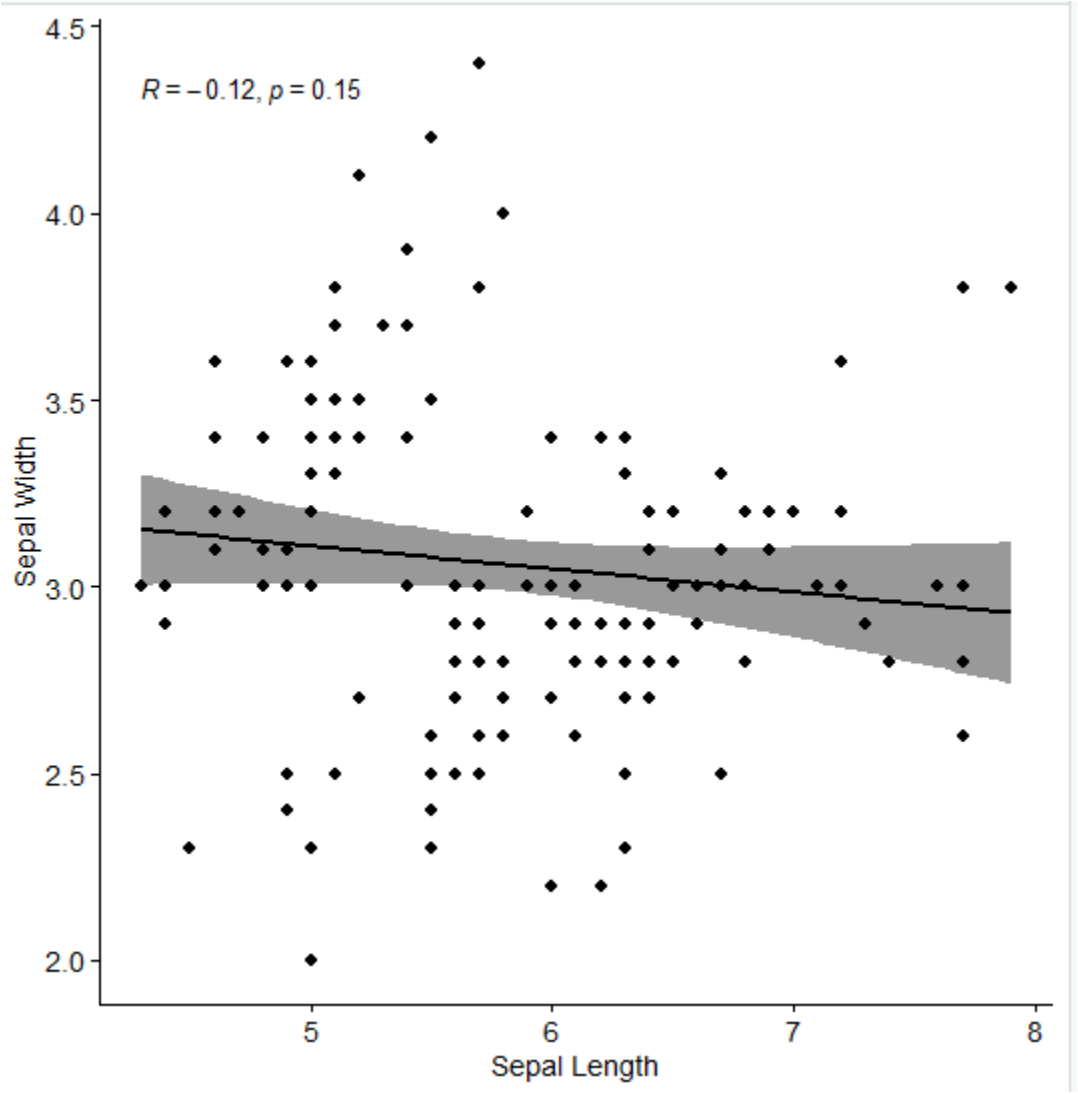

x$Sepal.Width
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
x$Sepal.Length

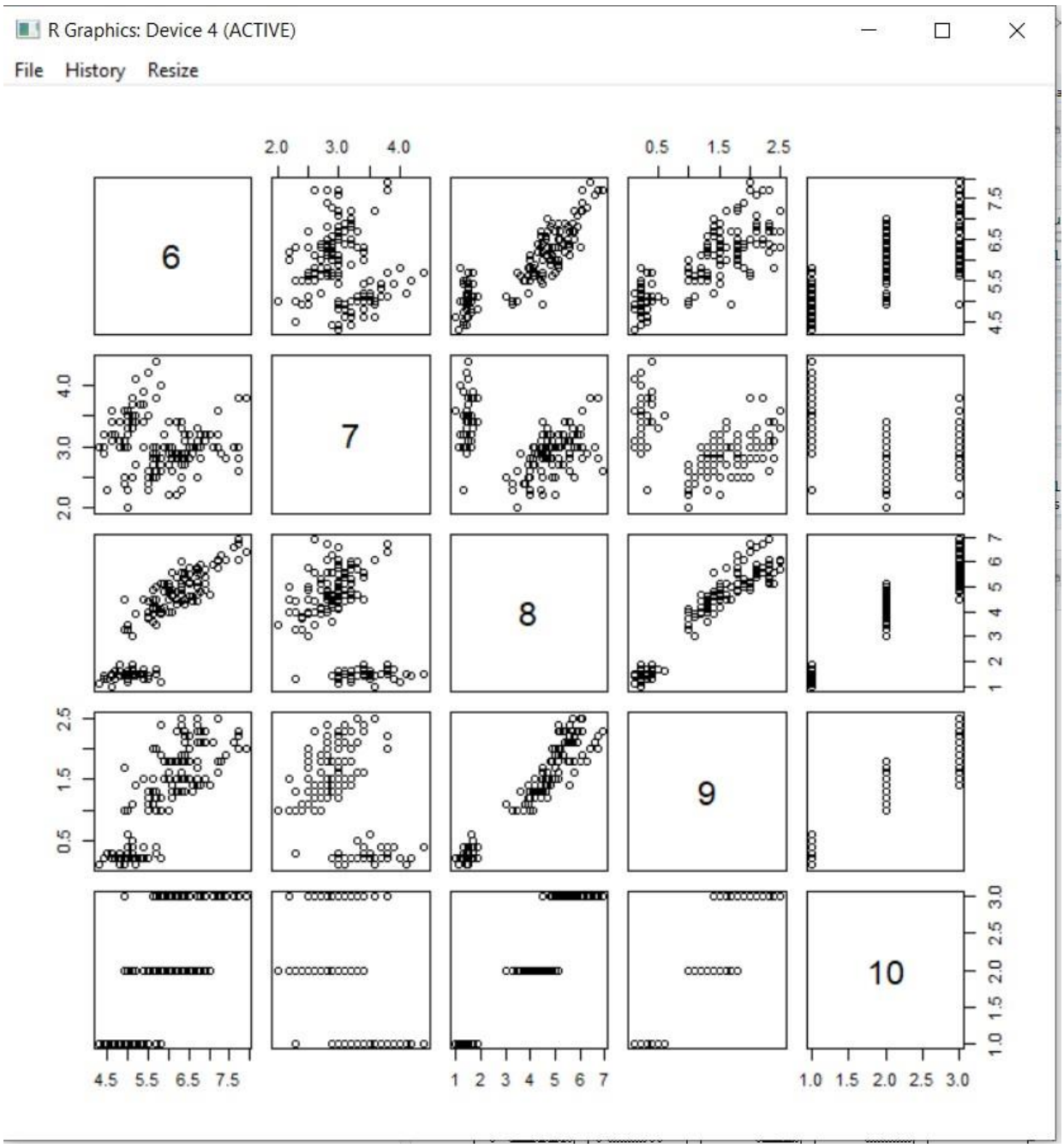

Scatterplot
x$Sepal.Width
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
x$Sepal.Length

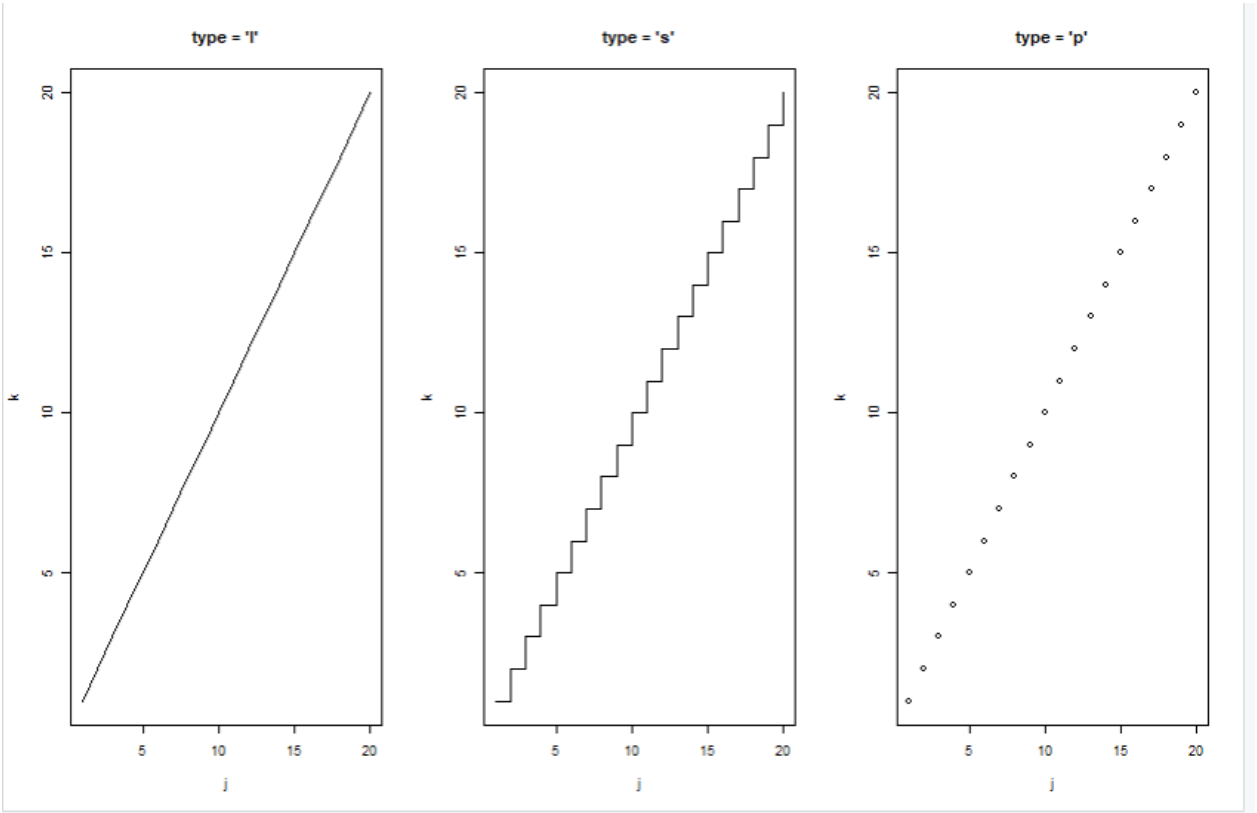

Barplot
table(x$Sepal.Length)
0
2
4
6
8
10
4.3
4.6
4.9
5.2
5.5
5.8
6.1
6.4
6.7
7
7.3
7.6
7.9

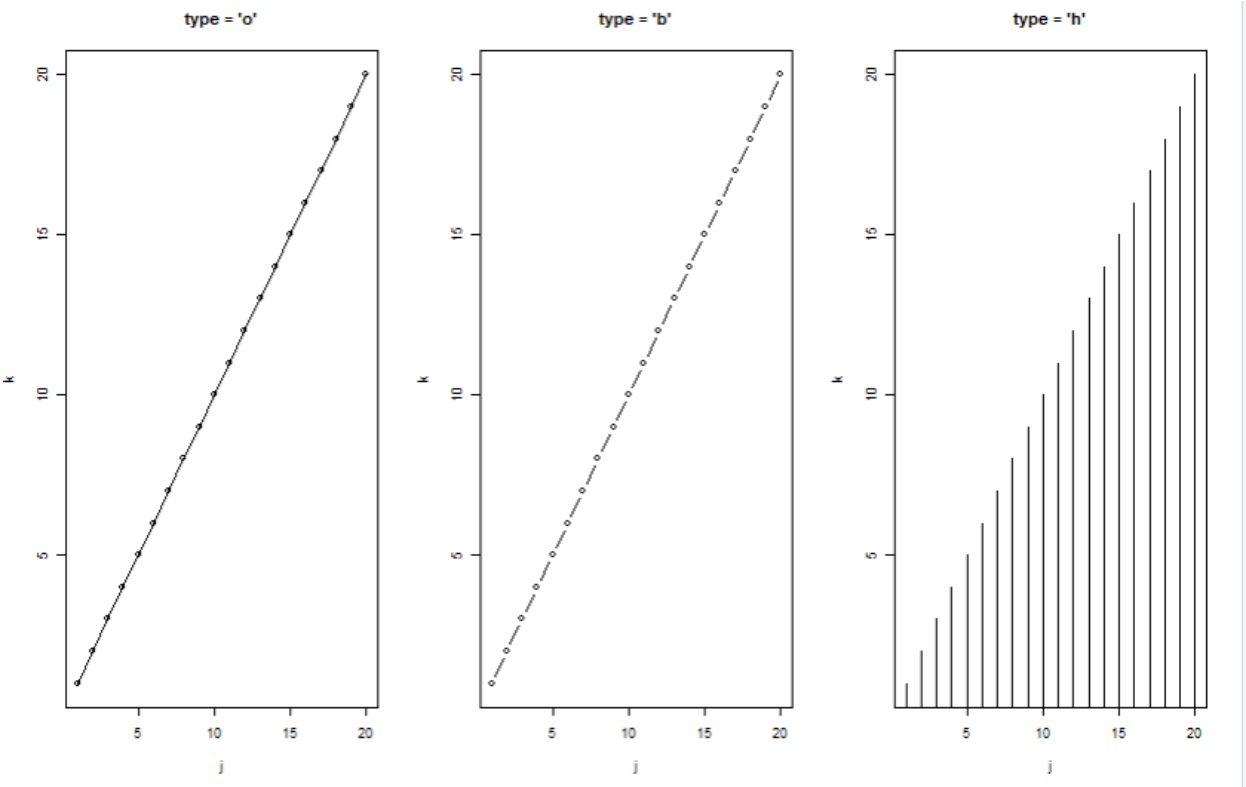

x$Sepal.Length
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
2
2.3
2.5
2.7
2.9
3.1
3.3
3.5
3.7
3.9
4.1
4.4
x$Sepal.Width

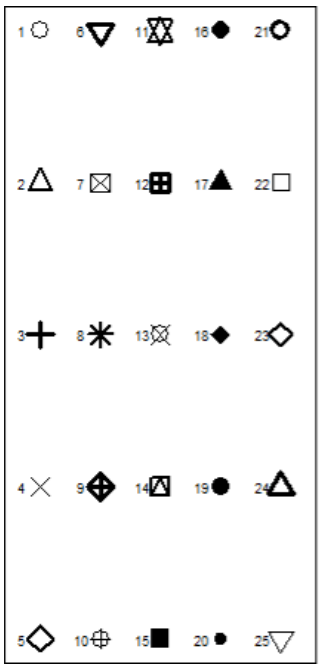

5
4
3
2
1
0
y
-5.0
-2.5
0.0
2.5
5.0
x

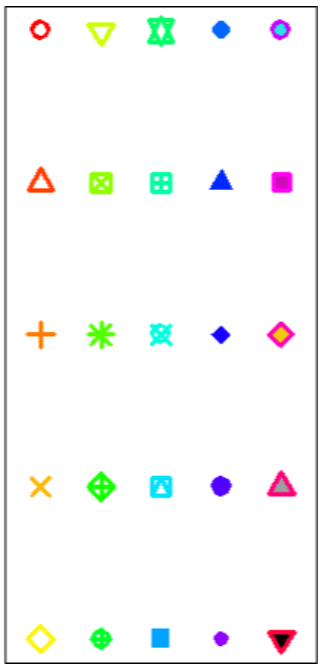

R = −0.12, p = 0.15
Sepal Width
Sepal Length
4.5
4.0
3.5
3.0
2.5
2.0
5
6
7
8

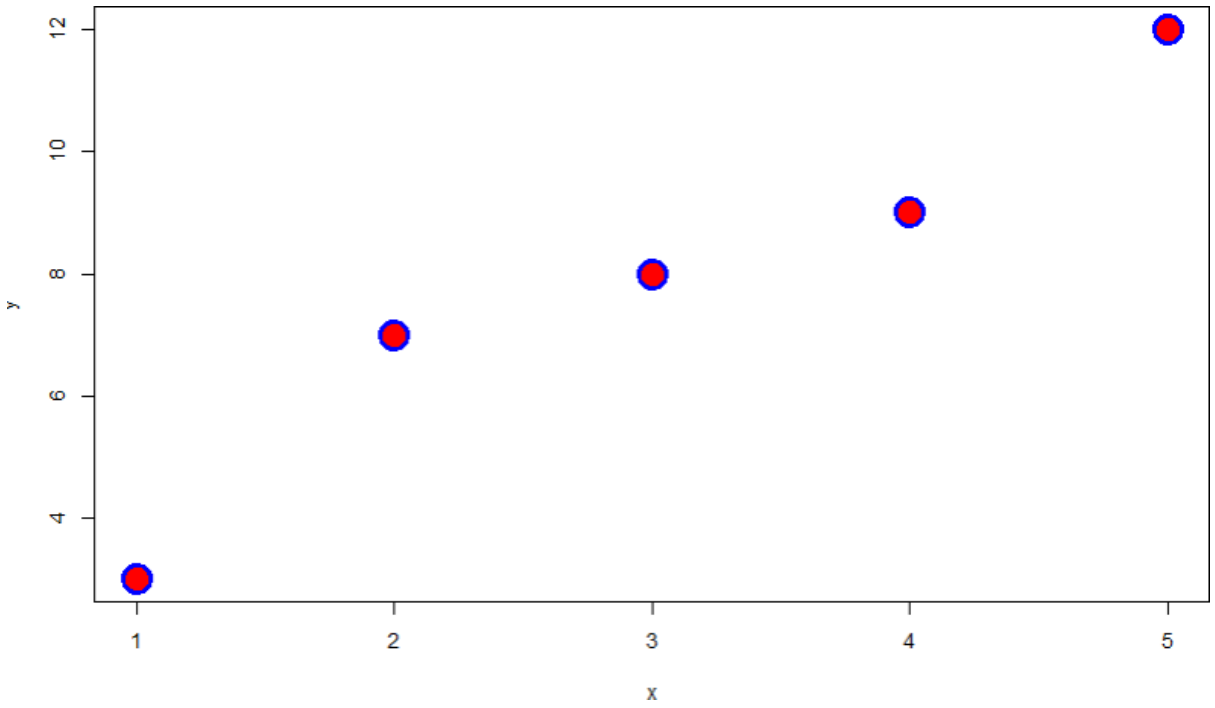

R Graphics: Device 4 (ACTIVE)
File History Resize
6
7
8
9
10

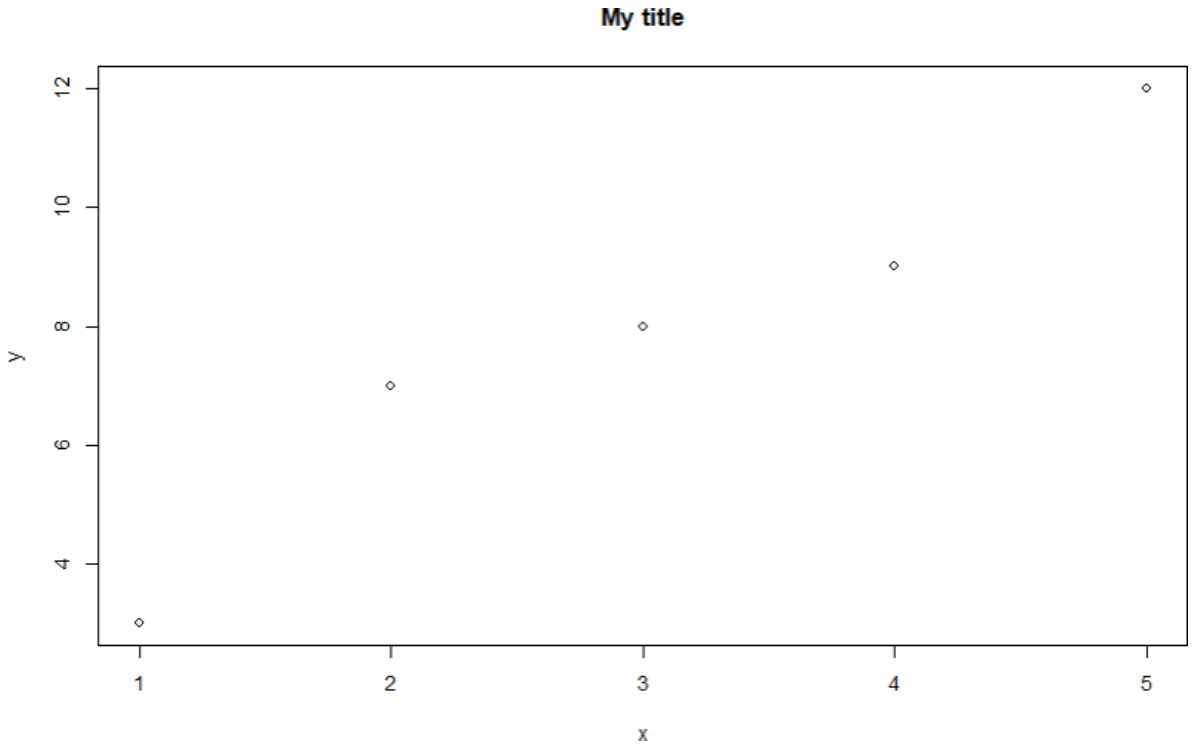

type = 'l'
type = 's'
type = 'p'
k
j
5
10
15
20

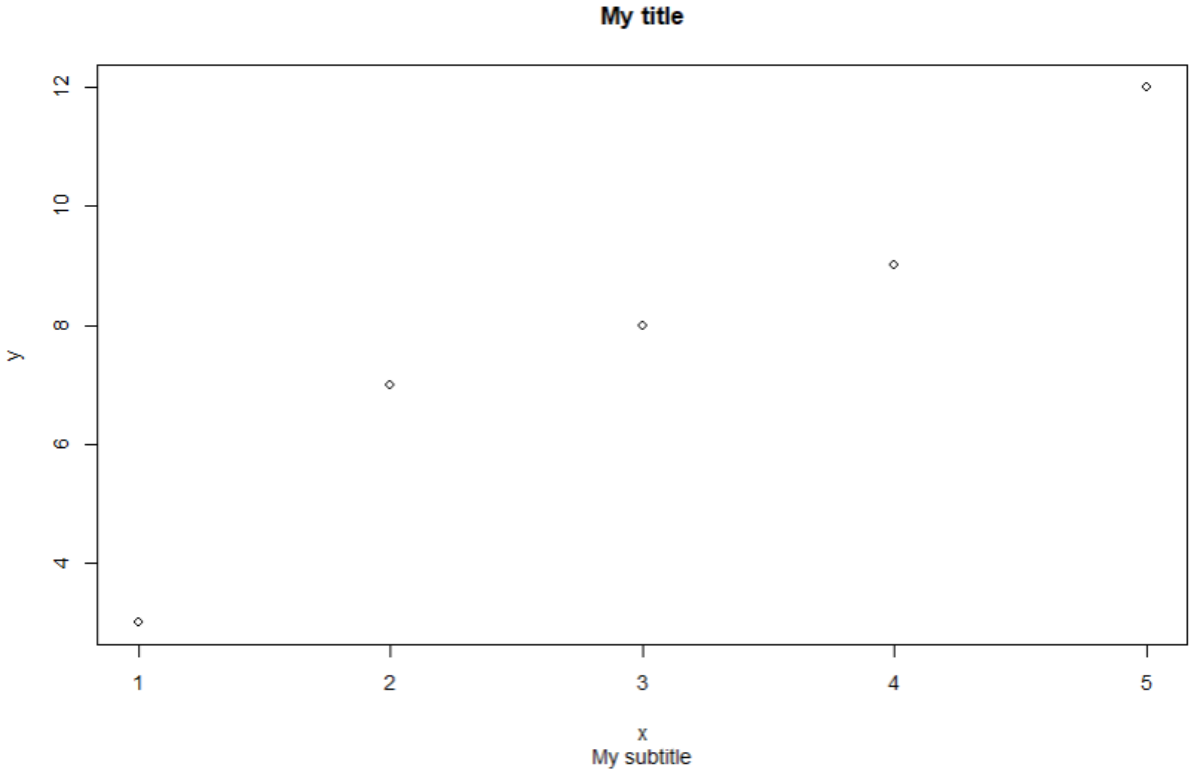

type = 'o'
type = 'b'
type = 'h'
k
j
5
10
15
20

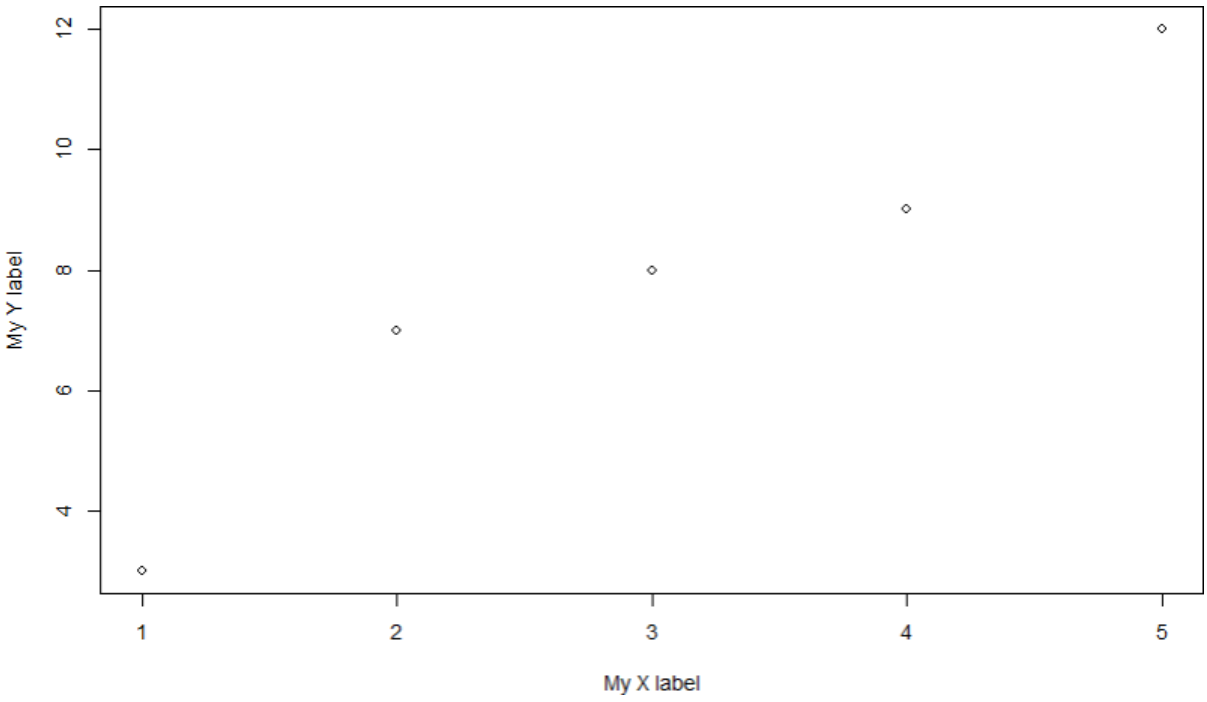

1
6
11
16
21
2
7
12
17
22
3
8
13
18
23
4
9
14
19
24
5
10
15
20
25

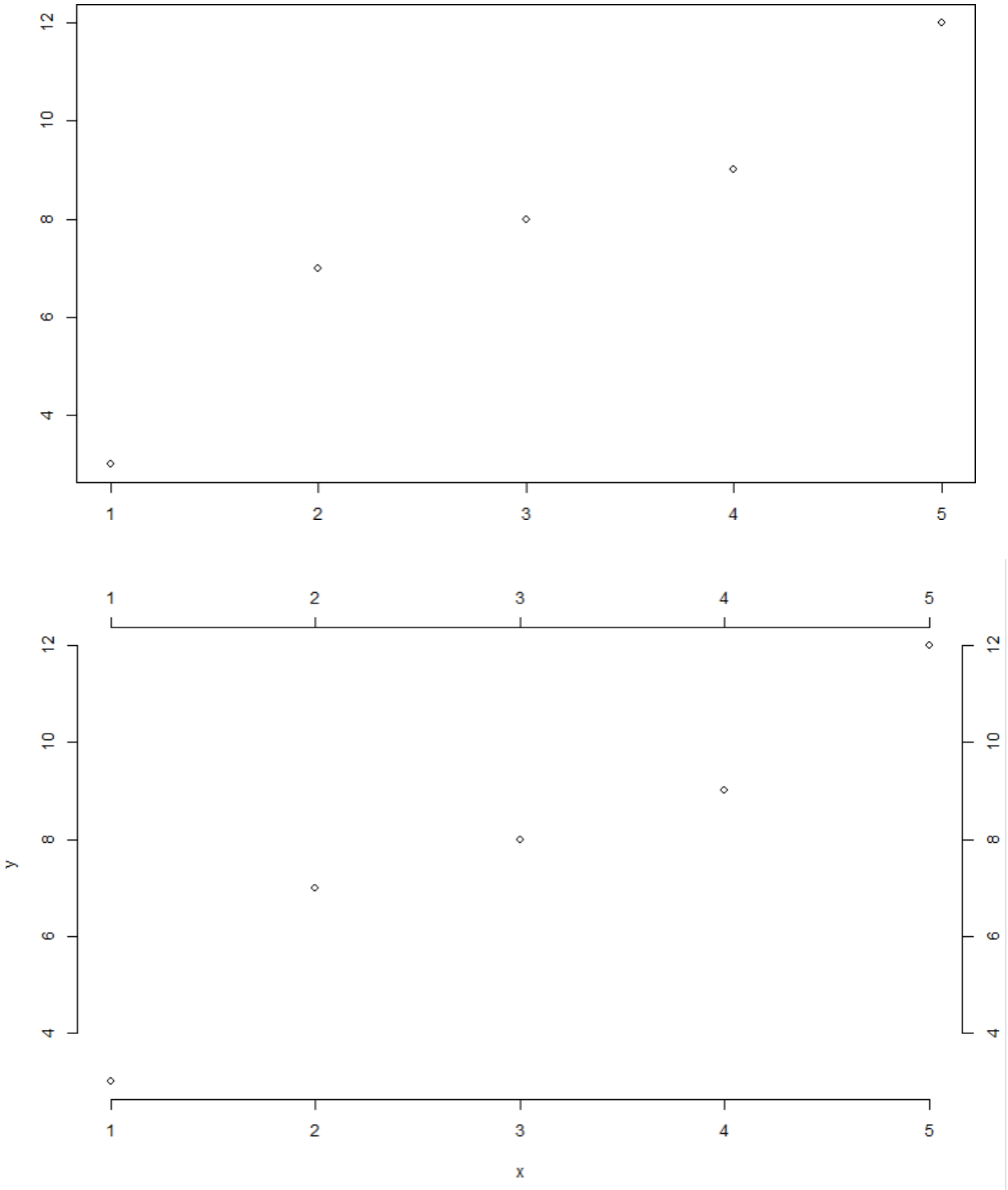


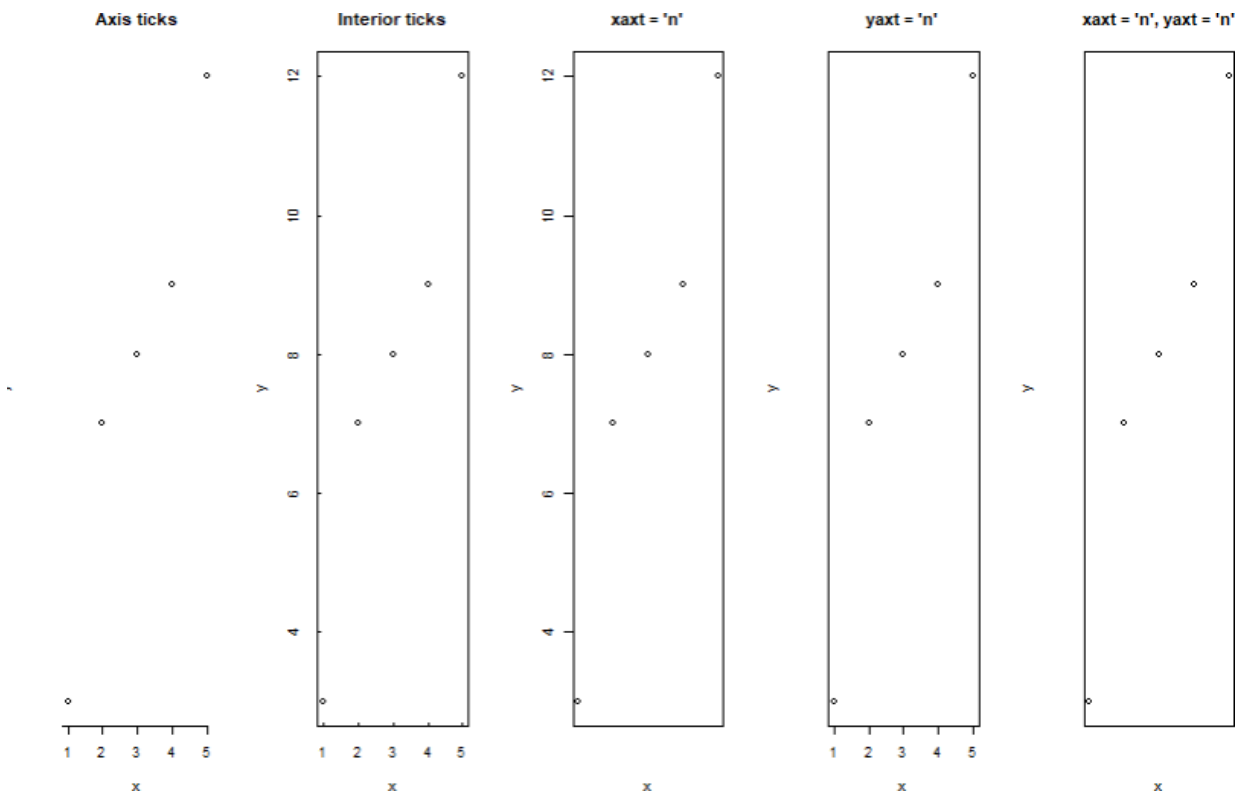

y
12
10
8
6
4
1
2
3
4
5
x

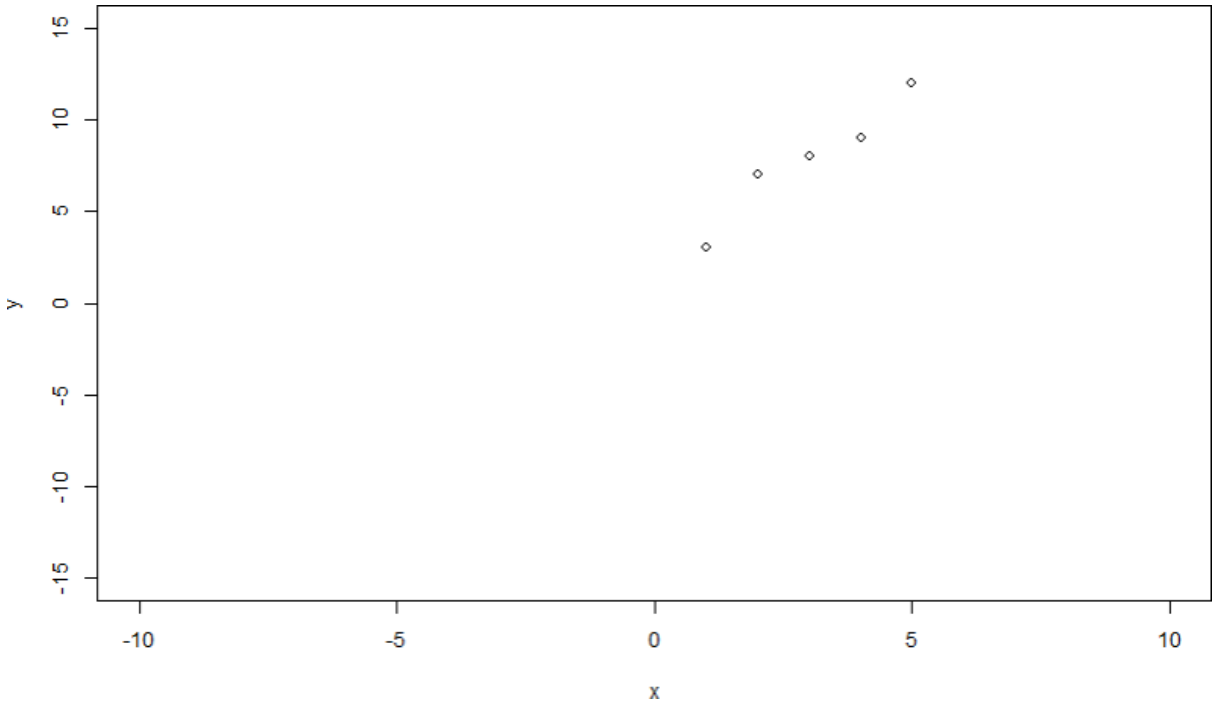

My title
y
12
10
8
6
4
1
2
3
4
5
x

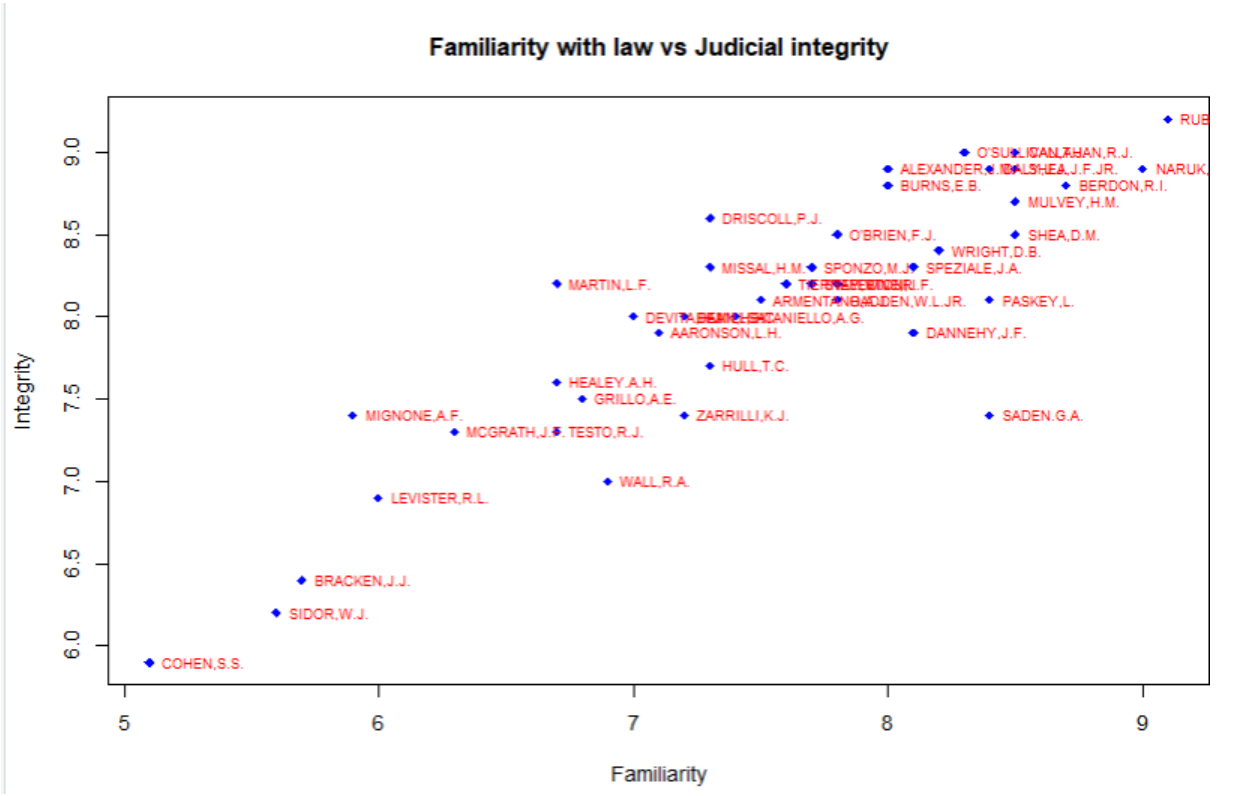

My title
y
12
10
8
6
4
1
2
3
4
5
x
My subtitle

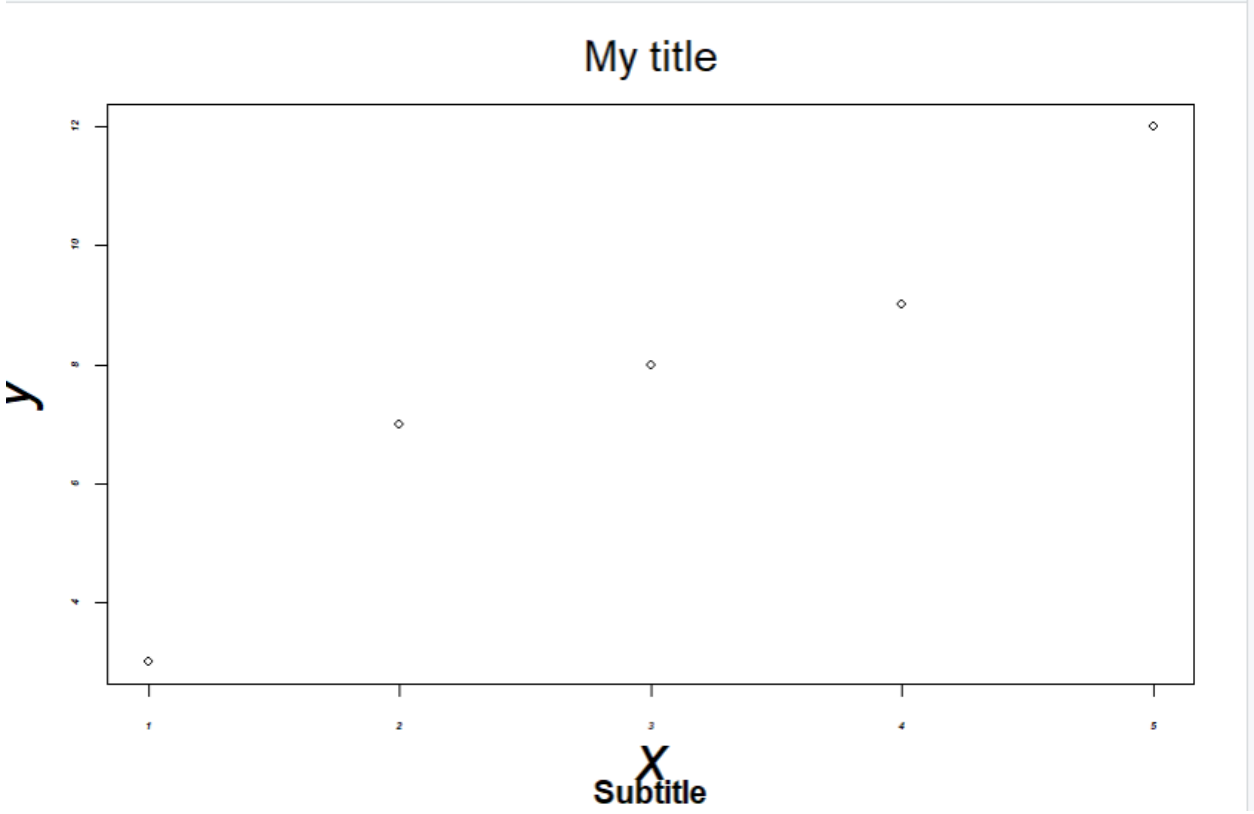

My Y label
12
10
8
6
4
1
2
3
4
5
My X label

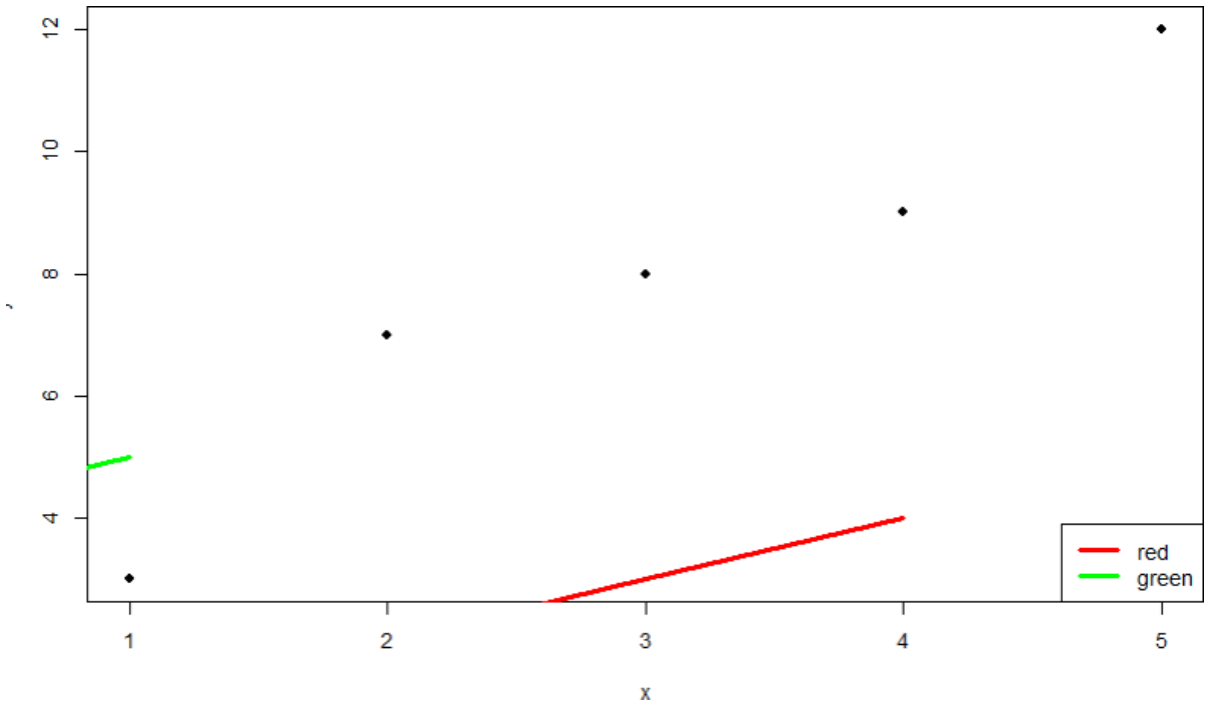

12
10
8
6
4
1
2
3
4
5
y
x


Axis ticks
Interior ticks
xaxt = 'n'
yaxt = 'n'
xaxt = 'n', yaxt = 'n'
x
y


x
y


Familiarity with law vs Judicial integrity
Integrity
Familiarity
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5
6
7
8
9
RUB
O'SULLIVAN,R.J.
ALEXANDER,J.F.JR.
NARUK,
BURNS,E.B.
BERDON,R.I.
MULVEY,H.M.
DRISCOLL,P.J.
O'BRIEN,F.J.
SHEA,D.M.
WRIGHT,D.B.
MISSAL,H.M.
SPONZO,M.J.
SPEZIALE,J.A.
MARTIN,L.F.
ARMENTANO,W.L.JR.
PASKEY,L.
DANNEHY,J.F.
AARONSON,L.H.
HULL,T.C.
HEALEY,A.H.
GRILLO,A.E.
MIGNONE,A.F.
ZARRILLI,K.J.
SADEN,G.A.
TESTO,R.J.
WALL,R.A.
LEVISTER,R.L.
BRACKEN,J.J.
SIDOR,W.J.
COHEN,S.S.


My title
y
X
Subtitle
12
10
8
6
4
1
2
3
4
5


12
10
8
6
4
1
2
3
4
5
x
red
green