```
∨ question-4-code/random_walk.R 📮
                                                                                                                 +14 -11
••• @@ -1,34 +1,36 @@
       #install.packages("ggplot2")
 1
                                                                    1
                                                                          #install.packages("ggplot2")
       #install.packages("gridExtra")
 2
                                                                    2
                                                                          #install.packages("gridExtra")
                                                                    3
 4
       library(ggplot2)
                                                                    4
                                                                          library(ggplot2)
       library(gridExtra)
                                                                          library(gridExtra)
                                                                    7
                                                                         + random_walk <- function (n_steps, seed = 123) {
7 - random_walk <- function (n_steps) {</pre>
                                                                    8
                                                                    9
                                                                            set.seed(seed)
                                                                    10
 9
         df <- data.frame(x = rep(NA, n_steps), y = rep(NA,</pre>
                                                                    11
                                                                            df <- data.frame(x = rep(NA, n_steps), y = rep(NA,</pre>
       n_steps), time = 1:n_steps)
                                                                          n_steps), time = 1:n_steps)
10
                                                                    12
                                                                    13 + df[1,] \leftarrow c(0,0,1) # Starting point of random walk
11 - df[1,] <- c(0,0,1)
12
                                                                    14
                                                                         + for (i in 2:n_steps) { # For loop starts at i = 2 and
13 - for (i in 2:n_steps) {
                                                                    15
                                                                         runs until i = n_steps
14
                                                                    16
15
     - h <- 0.25
                                                                    17
                                                                         + h <- 0.25 # Constant height
                                                                    18
                                                                       + angle <- runif(1, min = 0, max = 2*pi) # random
           angle <- runif(1, min = 0, max = 2*pi)</pre>
                                                                    19
                                                                         angle generated between 0 and 2 pi
18
                                                                    20
           df[i,1] \leftarrow df[i-1,1] + cos(angle)*h
                                                                    21 + df[i,1] <- df[i-1,1] + cos(angle)*h # cos() changes
19
                                                                         x-direction
                                                                    22
20
21
           df[i,2] \leftarrow df[i-1,2] + sin(angle)*h
                                                                    23 + df[i,2] <- df[i-1,2] + sin(angle)*h # sin() changes
                                                                          y direction
                                                                    24
           df[i,3] <- i
                                                                         + df[i,3] <- i
                                                                    25
23
24
25
                                                                    27
                                                                    28
27 - return(df)
                                                                    29
                                                                         + return(df)
                                                                    30
                                                                    31
29
     - data1 <- random_walk(500)
                                                                         + data1 <- random_walk(500, seed = 123) # 500 steps in
                                                                    33
31
                                                                          this random walk (with seed)
32
                                                                    34
33
       plot1 <- ggplot(aes(x = x, y = y), data = data1) +
                                                                    35
                                                                           plot1 <- ggplot(aes(x = x, y = y), data = data1) +
34
                                                                    36
4
      @@ -40,7 +42,7 @@
                                                                    42
         ylab("y-coordinate")
                                                                            ylab("y-coordinate")
41
                                                                   43
42
                                                                    44
                                                                    45
43
     - data2 <- random walk(500)
                                                                         + data2 <- random_walk(500, seed = 123) # 500 steps in
                                                                           this random walk (with same seed so will be the same)
44
                                                                    46
45
       plot2 <- ggplot(aes(x = x, y = y), data = data2) +
                                                                    47
                                                                          plot2 <- ggplot(aes(x = x, y = y), data = data2) +
46
                                                                   48
@@ -53,3 +55,4 @@
                                                                            ylab("y-coordinate")
        ylab("y-coordinate")
                                                                    55
53
54
                                                                    56
       grid.arrange(plot1, plot2, ncol=2)
                                                                    57
                                                                          grid.arrange(plot1, plot2, ncol=2)
55
                                                                    58
```