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R10H44002

This homework is to practice making functions, using the 'apply’ function and the 'solve' command:

**Ex S2 making a function to calculate the number of steps to move 20 disks from rod A to rod C----**

disk\_mov<- function(n, from, via, to) {

if(n == 1) {

print(paste('Move disk', n , 'from', from, 'to', to))

return()

} else {

disk\_mov(n - 1, from, to, via)

print(paste('Move disk', n , 'from', from, 'to', to))

disk\_mov(n - 1, via, from, to)

steps <- 2^n - 1

return(paste("No. of steps =", steps))

return(disk\_mov(n - 1, via, from, to ))

}

}

disk\_mov(20, 'A', 'B', 'C')

**Output:**

[1] "Move disk 1 from A to B"

[1] "Move disk 2 from A to C"

[1] "Move disk 1 from B to C"

[1] "Move disk 3 from A to B"

[1] "Move disk 1 from C to A"

>>>……

[1] "Move disk 1 from B to C"

[1] "No. of steps = 1048575"

**Ex S3 using the “apply” command to calculate the medians, maximums, and minimums, of each row and each column----**

x <- matrix(c(3600, 5000, 12000, NA, 1000, 2000, 600, 7500, 1800, 9000,

3600, 4500, 10000, 8500, 3000, 10000, 1000, NA, 1200, 10000,

3800, 5500, 9000, 6000, 6600, 3000, 9600, 6500, 8200, 8000,

5000, 6600, 13000, 4500, 5000, NA, 10600, 9500, 7600, 6000,

6600, 8000, 17000, 3000, 7000, 1000, 12600, 8500, 6000, NA),5,10, byrow = TRUE)

#Rows

apply(x,1, median, na.rm=TRUE)

apply(x,1, min, na.rm=TRUE)

apply(x,1, max, na.rm=TRUE)

#Columns

apply(x,2, median, na.rm=TRUE)

apply(x,2, min, na.rm=TRUE)

apply(x,2, max, na.rm=TRUE)

**Output:**

#Rows

apply(x,1, median, na.rm=TRUE)

[1] 3600 4500 6550 6600 7000

apply(x,1, min, na.rm=TRUE)

[1] 600 1000 3000 4500 1000

apply(x,1, max, na.rm=TRUE)

[1] 12000 10000 9600 13000 17000

#Columns

apply(x,2, median, na.rm=TRUE)

[1] 3800 5500 12000 5250 5000 2500 9600 8000 6000 8500

apply(x,2, min, na.rm=TRUE)

[1] 3600 4500 9000 3000 1000 1000 600 6500 1200 6000

apply(x,2, max, na.rm=TRUE)

[1] 6600 8000 17000 8500 7000 10000 12600 9500 8200 10000

**Ex S8 using the 'solve' command to find 'x', 'y' and 'z' from the matrix----**

M <- matrix(c(1,-3,1,1,-2,3,1,-1,1),3,3, byrow = TRUE) # the two 3s before the byrow argument arranges the numbers by 3 rows and 3 columns

M

b <-c(4,6,4)

solve(M,b)

**Output:**

M

[,1] [,2] [,3]

[1,] 1 -3 1

[2,] 1 -2 3

[3,] 1 -1 1

b <-c(4,6,4)

solve(M,b)

[1] 3 0 1