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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
```