Estructuras de datos en R. Tarea 01

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Pregunta 1

Dadas las matrices A y B.

```
A = matrix(c(1:4,4:1,0,1,0,2,3,0,4,0), nrow = 4, byrow = TRUE)
B = matrix(c(4:1,0,3,0,4,1:4,0,1,0,2), nrow = 4, byrow = TRUE)
A
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    2    3    4
## [2,]    4    3    2    1
## [3,]    0    1    0    2
## [4,]    3    0    4    0
```

```
B
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    4    3    2    1
## [2,]    0    3    0    4
## [3,]    1    2    3    4
## [4,]    0    1    0    2
```

Se realizan las siguientes operaciones:

$A \cdot B$

```
AB =  A %*% B
AB
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    7   19   11   29
## [2,]   18   26   14   26
## [3,]    0    5    0    8
## [4,]   16   17   18   19
```

$B \cdot A$

```
BA = B %*% A
BA
```

```
##      [,1] [,2] [,3] [,4]
## [1,]   19   19   22   23
## [2,]   24    9   22    3
## [3,]   21   11   23   12
## [4,]   10    3   10    1
```

$(A \cdot B)^t$

```
t_AB = t(B %*% A)
t_AB
```

```
##      [,1] [,2] [,3] [,4]
## [1,]   19   24   21   10
## [2,]   19    9   11    3
## [3,]   22   22   23   10
## [4,]   23    3   12    1
```

$(B^t \cdot A)$

```
B_tA = t(B) %*% A
B_tA
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    4    9   12   18
## [2,]   18   17   19   19
## [3,]    2    7    6   14
## [4,]   23   18   19   16
```

$(A \cdot B)^{-1}$

```
invAB = solve(A %*% B)
invAB
```

```
##       [,1]  [,2]  [,3]  [,4]
## [1,] -1.66 -0.65  4.52  1.52
## [2,]  1.60  0.80 -4.60 -1.60
## [3,]  1.02  0.35 -2.84 -0.84
## [4,] -1.00 -0.50  3.00  1.00
```

$(A^{-1} \cdot B^t)$

```
A_invB_t = solve(A) %*% t(B)
A_invB_t
```

```
##               [,1] [,2] [,3] [,4]
## [1,]  6.000000e-01  2.4  6.4  1.2
## [2,] -3.330669e-16 -2.0 -7.0 -1.2
## [3,] -2.000000e-01 -0.8 -3.8 -0.4
## [4,]  1.000000e+00  1.0  5.0  0.6
```

Pregunta 2

Considera en un vector los números de tu DNI (puedes inventártelos) y llámalo dni.Define el vector en R.

```
dni = c(4,5,0,3,3,3,7,7)
```

Cuadrado de cada elemento:

```
dni_cuadrado <- dni^2
dni_cuadrado
```

```
## [1] 16 25  0  9  9  9 49 49
```

Raíz cuadrada de cada cifra:

```
dni_raiz <- sqrt(dni)
dni_raiz
```

```
## [1] 2.000000 2.236068 0.000000 1.732051 1.732051 1.732051 2.645751 2.645751
```

Suma total:

```
dni_suma <- sum(dni)
dni_suma
```

```
## [1] 32
```

Pregunta 3

Considera el vector de las letras de tu nombre y apellido. Llámalo name. Define dicho vector en R.

```
name = unlist(strsplit("ALBERTOSIMON", split = ""))
```

Subvector nombre.

```
firstname = name[1:7]
firstname
```

```
## [1] "A" "L" "B" "E" "R" "T" "O"
```

Subvector apellido.

```
surname = name[8:length(name)]
surname
```

```
## [1] "S" "I" "M" "O" "N"
```

Orden alfabético.

```
nameletters = sort(name)
nameletters
```

```
##  [1] "A" "B" "E" "I" "L" "M" "N" "O" "O" "R" "S" "T"
```

Vector a matriz

```
namematrix = matrix(name, nrow = 2, byrow = TRUE)
namematrix
```

```
##      [,1] [,2] [,3] [,4] [,5] [,6]
## [1,] "A"  "L"  "B"  "E"  "R"  "T"
## [2,] "O"  "S"  "I"  "M"  "O"  "N"
```