Matrices

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R

Matrices

```
row = matrix(c(1,2,3,4), nrow = 1) # Para crear una matriz fila
row
```

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

```
col = matrix(c(1,2,3,4), ncol = 1) # Para crear una matriz columna
col
```

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

```
# Creación de matrices con MATRIX

A = matrix(c(1,1,3,5,2,4,3,-2,-2,2,-1,3), nrow = 3, ncol = 4, byrow = TRUE)
A
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    1    3    5
## [2,]    2    4    3   -2
## [3,]   -2    2   -1    3
```

```
B = matrix(c(1,0,2,3,3,2,1,-2,3), nrow = 3, byrow = FALSE)
B
```

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

```r
# Creación de matrices con BIND

C = rbind(c(1,2,3),c(4,5,6),c(7,8,9)) # Por fila
C
```

```
##      [,1] [,2] [,3]
## [1,]    1    2    3
## [2,]    4    5    6
## [3,]    7    8    9
```

```r
D = cbind(c(1,2,3),c(4,5,6),c(7,8,9)) # Por columna
D
```

```
##      [,1] [,2] [,3]
## [1,]    1    4    7
## [2,]    2    5    8
## [3,]    3    6    9
```

```r
# Para acceder a la matriz

A[3,3] # Elemento a33
```

```
## [1] -1
```

```r
A[1,]  # Primera fila
```

```
## [1] 1 1 3 5
```

```r
A[,2]  # Segunda columna
```

```
## [1] 1 4 2
```

```r
# Crear matrices de ceros y unos
O = matrix(0, nrow = 3, ncol = 3)
O
```

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

```r
Ones = matrix(1, nrow = 3, ncol = 3)
Ones
```

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

```r
# Matriz diagonal
E = diag(c(1,2,3,4,5,6))
E
```

```
##      [,1] [,2] [,3] [,4] [,5] [,6]
## [1,]    1    0    0    0    0    0
## [2,]    0    2    0    0    0    0
## [3,]    0    0    3    0    0    0
## [4,]    0    0    0    4    0    0
## [5,]    0    0    0    0    5    0
## [6,]    0    0    0    0    0    6
```

```r
# Para sacar los elementos de la diagonal de una matriz
diag(A)
```

```
## [1]  1  4 -1
```

```r
# Numero de filas y columnas
nrow(A)
```

```
## [1] 3
```

```r
ncol(A)
```

```
## [1] 4
```

```r
dim(A)
```

```
## [1] 3 4
```

Manipulación de Matrices

```r
sum(A) # Suma todos los elementos de la matriz
```

```
## [1] 19
```

```r
# Suma por filas y columnas
rowSums(A)
```

```
## [1] 10  7  2
```

```r
colSums(A)
```

```
## [1] 1 7 5 6
```

```r
# Producto de todos los elementos
prod(A)
```

```
## [1] -8640
```

```r
# Media
mean(A)
```

```
## [1] 1.583333
```

```r
rowMeans(A)
```

```
## [1] 2.50 1.75 0.50
```

```r
colMeans(A)
```

```
## [1] 0.3333333 2.3333333 1.6666667 2.0000000
```

Operaciones de Matrices

```r
# Traspuesta
A
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    1    3    5
## [2,]    2    4    3   -2
## [3,]   -2    2   -1    3
```

```r
t(A)
```

```
##      [,1] [,2] [,3]
## [1,]    1    2   -2
## [2,]    1    4    2
## [3,]    3    3   -1
## [4,]    5   -2    3
```

```r
# Calcular traza de la matriz
sum(diag(A))
```

```
## [1] 4
```

```r
# Operaciones
A = rbind(c(1,2,3),c(4,5,6),c(7,8,9)) # Por fila
B = rbind(c(1,0,2),c(3,0,4),c(5,0,6)) # Por fila
A+B
```

```
##      [,1] [,2] [,3]
## [1,]    2    2    5
## [2,]    7    5   10
## [3,]   12    8   15
```

```r
5*A
```

```
##      [,1] [,2] [,3]
## [1,]    5   10   15
## [2,]   20   25   30
## [3,]   35   40   45
```

```r
A%*%B # Multiplicar matrices
```

```
##      [,1] [,2] [,3]
## [1,]   22    0   28
## [2,]   49    0   64
## [3,]   76    0  100
```

```r
A*B   # Producto elemento a elemento
```

```
##      [,1] [,2] [,3]
## [1,]    1    0    6
## [2,]   12    0   24
## [3,]   35    0   54
```

```r
# Potencia enesima de una matriz
library(Biodem)
mtx.exp(A,4) # (paquete Biodem)
```

```
##       [,1]  [,2]  [,3]
## [1,]  7560  9288 11016
## [2,] 17118 21033 24948
## [3,] 26676 32778 38880
```

```r
library(expm)
```

```
## Loading required package: Matrix
```

```
##
## Attaching package: 'expm'
```

```
## The following object is masked from 'package:Matrix':
##
##     expm
```

```r
A%^%4        # (paquete expm)
```

```
##       [,1]  [,2]  [,3]
## [1,]  7560  9288 11016
## [2,] 17118 21033 24948
## [3,] 26676 32778 38880
```

Rango e inversa de Matrices

```r
# Rango
qr(A)$rank
```

```
## [1] 2
```

```r
# Inversa
#solve(A)            # Si no existe da un error
#round(A%*%solve(A)) # Para ver que me da la matriz identidad
```

Python

Matlab

```
```