Matrices operation

Arithmetic operation

In [1]:
```
mat1 <- matrix(11:20,nrow=2)
```

In [2]:
```
mat2 <- matrix(1:10,nrow=2)
```

In [3]:
```
print(mat1)
```

```
     [,1] [,2] [,3] [,4] [,5]
[1,]   11   13   15   17   19
[2,]   12   14   16   18   20
```

In [4]:
```
print(mat2)
```

```
     [,1] [,2] [,3] [,4] [,5]
[1,]    1    3    5    7    9
[2,]    2    4    6    8   10
```

In [5]:
```
# operation

print(mat1 + mat2)
```

```
     [,1] [,2] [,3] [,4] [,5]
[1,]   12   16   20   24   28
[2,]   14   18   22   26   30
```

In [6]:
```
print(mat1 * mat2)
```

```
     [,1] [,2] [,3] [,4] [,5]
[1,]   11   39   75  119  171
[2,]   24   56   96  144  200
```

The above matrix multiplication is a simple arithmetic multiplication

For the actual matrix multiplication use **%*%** operator

In [7]:
```
mat3 <- matrix(2:5,nrow=2)
```

In [8]:
```
mat4 <- matrix(6:9,nrow=2)
```

In [9]:
```
print(mat3)
```

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

In [10]:
```
print(mat4)
```

```
     [,1] [,2]
[1,]    6    8
[2,]    7    9
```

In [11]:
```
print(mat3 %*% mat4)
```

```
     [,1] [,2]
[1,]   40   52
[2,]   53   69
```

Matrix and scalar operation

In [12]:
```
print(mat1 * 4)
```

```
     [,1] [,2] [,3] [,4] [,5]
[1,]   44   52   60   68   76
[2,]   48   56   64   72   80
```

In [13]:
```
print(mat1 ^ 2)
```

```
     [,1] [,2] [,3] [,4] [,5]
[1,]  121  169  225  289  361
[2,]  144  196  256  324  400
```

In [14]:
```
print(1 / mat1)
```

```
           [,1]       [,2]       [,3]       [,4]       [,5]
[1,] 0.09090909 0.07692308 0.06666667 0.05882353 0.05263158
[2,] 0.08333333 0.07142857 0.06250000 0.05555556 0.05000000
```

Comparison operation

In [15]:
```
print(mat1 > mat2)
```

```
     [,1] [,2] [,3] [,4] [,5]
[1,] TRUE TRUE TRUE TRUE TRUE
[2,] TRUE TRUE TRUE TRUE TRUE
```

In [16]:
```
# With Scalar
print(mat1 < 4)
```

```
      [,1]  [,2]  [,3]  [,4]  [,5]
[1,] FALSE FALSE FALSE FALSE FALSE
[2,] FALSE FALSE FALSE FALSE FALSE
```

Matrices functions

In [17]:
```
mat <- matrix(15:20,nrow=2)
```

In [18]:
```
print(mat)
```

```
     [,1] [,2] [,3]
[1,]   15   17   19
[2,]   16   18   20
```

In [19]:
```
rownames(mat) <- c('Jack','John')
```

In [20]:
```
colnames(mat) <- c('Math','Science','English')
```

In [21]:
```
print(mat)
```

```
     Math Science English
Jack   15      17      19
John   16      18      20
```

---

rowSums()

In [22]:
```
rowSums(mat)
```

Jack	51
John	54

colSums()

In [23]:
```
colSums(mat)
```

Math	31
Science	35
English	39

rowMeans()

In [24]:
```
rowMeans(mat)
```

Jack	17
John	18

colMeans()

In [25]:
```
colMeans(mat)
```

Math	15.5
Science	17.5
English	19.5

rbind()

rbind() function is used to bind a new row

In [26]:
```
Jill <- c(21,22,23)
```

In [27]:
```
mat <- rbind(mat,Jill)
```

In [28]:
```
print(mat)
```

```
     Math Science English
Jack   15      17      19
John   16      18      20
Jill   21      22      23
```

cbind()

cbind() function is used to bind a new column

In [29]:
```
avg <- rowMeans(mat)
```

In [30]:
```
mat <- cbind(mat,avg)
```

In [31]:
```
print(mat)
```

```
     Math Science English avg
Jack   15      17      19  17
John   16      18      20  18
Jill   21      22      23  22
```

Indexing and Slicing

In [32]:
```
mat <- matrix(1:50,byrow=TRUE,ncol=5)
```

In [33]:
```
print(mat)
```

```
      [,1] [,2] [,3] [,4] [,5]
 [1,]    1    2    3    4    5
 [2,]    6    7    8    9   10
 [3,]   11   12   13   14   15
 [4,]   16   17   18   19   20
 [5,]   21   22   23   24   25
 [6,]   26   27   28   29   30
 [7,]   31   32   33   34   35
 [8,]   36   37   38   39   40
 [9,]   41   42   43   44   45
[10,]   46   47   48   49   50
```

In [34]:
```
# Indexing
# mat[row,col]

mat[2,4]
```

```
9
```

In [35]:
```
mat[1,]
```

```
1 2 3 4 5
```

In [44]:
```
mat[,4]
```

```
4 9 14 19 24 29 34 39 44 49
```

In [45]:
```
mat[c(1,4),c(2,3)]
```

```
 2  3
17 18
```

In [37]:
```
#Slicing

print(mat[1:2,2:4])
```

```
     [,1] [,2] [,3]
[1,]    2    3    4
[2,]    7    8    9
```

In [38]:
```
print(mat[1:2,2])
```

```
[1] 2 7
```

In [39]:
```
print(mat[2,2:4])
```

```
[1] 7 8 9
```

In [42]:
```
# Conditional selection

mat[mat%%2==0]
```

```
 6  16  26  36  46   2  12  22  32  42   8  18  28  38  48   4  14  24  34  44  10  20
30  40  50
```