INTRODUCTION TO R

Create and Name Matrices

Matrix

- Vector: 1D array of data elements
- Matrix: 2D array of data elements
- Rows and columns
- One atomic vector type

Create a matrix `matrix()`

```
> matrix(1:6, nrow = 2)
     [,1] [,2] [,3]
[1,]    1    3    5
[2,]    2    4    6

> matrix(1:6, ncol = 3)
     [,1] [,2] [,3]
[1,]    1    3    5
[2,]    2    4    6

> matrix(1:6, nrow = 2, byrow = TRUE)
     [,1] [,2] [,3]
[1,]    1    2    3
[2,]    4    5    6
```

Create a matrix: recycling

```
> matrix(1:3, nrow = 2, ncol = 3)
     [,1] [,2] [,3]
[1,]    1    3    2
[2,]    2    1    3

> matrix(1:4, nrow = 2, ncol = 3)
     [,1] [,2] [,3]
[1,]    1    3    1
[2,]    2    4    2
Warning message:
In matrix(1:4, nrow = 2, ncol = 3) :
  data length [4] is not a sub-multiple or multiple of the
                                    number of columns [3]
```

rbind(), cbind()

```
> cbind(1:3, 1:3)
     [,1] [,2]
[1,]    1    1
[2,]    2    2
[3,]    3    3

> rbind(1:3, 1:3)
     [,1] [,2] [,3]
[1,]    1    2    3
[2,]    1    2    3
```

rbind(), cbind()

```
> m <- matrix(1:6, byrow = TRUE, nrow = 2)

> rbind(m, 7:9)
     [,1] [,2] [,3]
[1,]    1    2    3
[2,]    4    5    6
[3,]    7    8    9

> cbind(m, c(10, 11))
     [,1] [,2] [,3] [,4]
[1,]    1    2    3   10
[2,]    4    5    6   11
```

Naming a matrix `rownames()`, `colnames()`

```
> m <- matrix(1:6, byrow = TRUE, nrow = 2)

> rownames(m) <- c("row1", "row2")

> m
     [,1] [,2] [,3]
row1    1    2    3
row2    4    5    6

> colnames(m) <- c("col1", "col2", "col3")

> m
     col1 col2 col3
row1    1    2    3
row2    4    5    6
```

Naming a matrix

```
> m <- matrix(1:6, byrow = TRUE, nrow = 2)
```

Naming a matrix

```
> m <- matrix(1:6, byrow = TRUE, nrow = 2,
              dimnames = list(c("row1", "row2"),
                              c("col1", "col2", "col3")))

> m
     col1 col2 col3
row1    1    2    3
row2    4    5    6
```

Coercion

```
> num <- matrix(1:8, ncol = 2)
> num
     [,1] [,2]
[1,]    1    5
[2,]    2    6
[3,]    3    7
[4,]    4    8
> char <- matrix(LETTERS[1:6], nrow = 4, ncol = 3)
> char
     [,1] [,2] [,3]
[1,] "A"  "E"  "C"
[2,] "B"  "F"  "D"
[3,] "C"  "A"  "E"
[4,] "D"  "B"  "F"
```

Coercion

```
> num <- matrix(1:8, ncol = 2)
> char <- matrix(LETTERS[1:6], nrow = 4, ncol = 3)

> cbind(num, char)
     [,1] [,2] [,3] [,4] [,5]
[1,] "1"  "5"  "A"  "E"  "C"
[2,] "2"  "6"  "B"  "F"  "D"
[3,] "3"  "7"  "C"  "A"  "E"
[4,] "4"  "8"  "D"  "B"  "F"
```

Contain different types? `list` or `data.frame`