Lecture 1.7 – Matrices and Arrays

Specific Learning Objectives:

1.1.9 – Create vectors, arrays, matrices, lists, and data frames.

1.1.10 – Understand vectors and vectorized calculations.

1.1.11 – Understand the data classes of R.

1.1.12 – Learn how to index vectors, arrays, matrices, lists, and data frames.

Check Your Understanding

You have four vectors in your environment:

```
v1 <- c(1, 1, 1)        v3 <- c(3, 3, 3)

v2 <- rep(2, 3)         v4 <- rep(4, 3)
```

You run the following line to create a matrix:

```
my.matrix <- matrix(c(v1,v2,v3,v4), nrow=4, byrow=FALSE)
```

Which describes the output matrix `my.matrix`?

a)

```
> matrix(c(v1,v2,v3,v4),nrow=3,byrow=FALSE)
     [,1] [,2] [,3] [,4]
[1,]    1    2    3    4
[2,]    1    2    3    4
[3,]    1    2    3    4
```

Correct

b)

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

c)

```
> matrix(c(v1,v2,v3,v4),nrow=3,byrow=TRUE)
     [,1] [,2] [,3] [,4]
[1,]    1    1    1    2
[2,]    2    2    3    3
[3,]    3    4    4    4
```

d)

```
> matrix(c(v1,v2,v3,v4),nrow=4,byrow=TRUE)
     [,1] [,2] [,3]
[1,]    1    1    1
[2,]    2    2    2
[3,]    3    3    3
[4,]    4    4    4
```

Check Your Understanding

You run the following line to create a matrix:

```
my.matrix2 <- matrix(seq(1,21), nrow=7, byrow=TRUE)
```

Which line of code will subset only two-digit numbers (those greater than 9)?

Correct

a) `my.matrix2[4:7, ]`

```
> my.matrix2[4:7,]
     [,1] [,2] [,3]
[1,]   10   11   12
[2,]   13   14   15
[3,]   16   17   18
[4,]   19   20   21
```

b) `my.matrix2[4:7, 3]`

```
> my.matrix2[4:7,3]
[1] 12 15 18 21
```

c) `my.matrix2[>9]`

```
> my.matrix2[>9]
Error: unexpected '>' in "my.matrix2[>"
```

d) `my.matrix2[ , 4:7]`

```
> my.matrix2[,4:7]
Error in my.matrix2[, 4:7] :
subscript out of bounds
```

Check Your Understanding

```
> a1
, , 1

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

, , 2

     [,1] [,2] [,3]
[1,]    1    7    9
[2,]    2    6    3
[3,]    8    1    4

, , 3

     [,1] [,2] [,3]
[1,]    1    0    3
[2,]    9    2    1
[3,]    6    2    8
```

column

row

Which position in a1 hold the value 0?

a) `a1[1, 1, 1]`

b) `a1[1, 2, 3]`

Correct

c) `a1[2, 1, 3]`

d) `a1[1, 2, 1]`

Which positions in `a1` hold the value 7?

Write down your answer!

In-class Exercises

1. Assignments 1.8

2. Assignment 1.9

Action Items

1. **Complete assignments 1.8 and 1.9.**

2. **Read Davies Ch. 5 for next time.**