

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`?

```
> matrix(c(v1,v2,v3,v4),nrow=3,byrow=FALSE)
```

a)

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

```
> matrix(c(v1,v2,v3,v4),nrow=3,byrow=TRUE)
```

c)

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

Correct

b)

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

```
> matrix(c(v1,v2,v3,v4),nrow=4,byrow=TRUE)
```

d)

	[,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 column
```

row →

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

Which position in a1 hold the value 0?

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

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

Correct

Which positions in a1 hold the value 7?

Write down your answer!

In-class Exercises

- 1. Exercise 3.1**
- 2. Exercise 3.2 a and b**
- 3. Exercise 3.3 a**
- 4. Assignments 1.8 and 1.9**

Action Items

- 1. Complete assignments 1.8 and 1.9.**
- 2. Read Davies Ch. 5 for next time.**