

# Chapter 5

## Matrices in R

- Matrix arithmetic requires special operators:

```
> matrix1 <- matrix(nrow = 3, ncol = 2, data = c(1, 2,
+ 0, 1, 2, 5), byrow = TRUE)
> matrix2 <- matrix(nrow = 2, ncol = 1, data = c(21, 22),
+ byrow = TRUE)
> matrix1
```

```
      [,1] [,2]
[1,]    1    2
[2,]    0    1
[3,]    2    5
```

```
> matrix2
```

```
      [,1]
[1,]   21
[2,]   22
```

```
> matrix1 %*% matrix2
```

```
      [,1]
[1,]   65
[2,]   22
[3,]  152
```

- Element-by-element multiplication uses no special operators:

```
> matrix1 * matrix1
```

```
      [,1] [,2]
[1,]    1    4
[2,]    0    1
[3,]    4   25
```

```
> matrix1^2
```

```
      [,1] [,2]
[1,]    1    4
[2,]    0    1
[3,]    4   25
```

- Transpose of matrices are found using `t()`

```
> XtX <- t(matrix1) %*% matrix1
> XtX
```

```
      [,1] [,2]
[1,]    5   12
[2,]   12   30
```

- Inverses of matrices are found using `solve()`:

```
> XtX.inverse <- solve(XtX)
> XtX.inverse %*% XtX
```

```
      [,1]      [,2]
[1,] 1.000000e+00 8.881784e-15
[2,] 4.440892e-16 1.000000e+00
```

```
> zapsmall(XtX.inverse %*% XtX)
```

```
      [,1] [,2]
[1,]    1    0
[2,]    0    1
```