Matrix Algebra in R
Introduction

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Change `eval` to `TRUE` if you want to knit this document.

This worksheet provides an introduction to matrix algebra in `R`:

Throughout the course, we will demonstrate code and leave some empty *code chunks* for you to fill in. We will also provide solutions after the session.

Feel free to modify this document with your own comments and clarifications.

EXERCISE 1 Use the following *code chunk* to create a matrix `matrixB` with 2 rows and 4 columns and a matrix `matrixC` with 4 rows and 2 columns:

NOTE: you may decide what the elements are for both matrices - they can be anything as long as the dimensions are right.

```
# Your turn
```

In `R`, there are three key operations that we can do with matrices, addition (`+`), multiplication (`*`) and matrix multiplication (`%*%`). Each of these operations can only be used if the matrices are compatible.

EXERCISE 2 Perform the following operations on `m_A` and `m_B`:

1) Their sum

2) Their element-wise product (the Hadamard product)

3) Their product

4) The product of the first matrix with the transpose of the second matrix

```
m_A <- matrix(1:9,  nrow=3, ncol=3)
m_B <- matrix(6:14, nrow=3, ncol=3)
```

```
# Your turn
```

EXERCISE 3 We created two matrices, `matrix1` and `matrix2` in the code chunk below. Perform the following operations and display the results:

1) Add `matrix1` to `matrix2` and take the transpose of the sum, and matrix-multiply the result with `matrix2`

2) Obtain the transpose of the product of `matrix1` and `matrix2` and element-wise multiply the result with `matrix1`

```r
matrix1 <- matrix(1:9, nrow=3, ncol=3)
matrix2 <- matrix(c(1,0,0,0,3,4,5,9,2), nrow=3, ncol=3)

# 1.
# Your turn

# 2.
# Your turn
```