PSYC 502 HW10 - R Matrices

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```
knitr::opts_chunk$set(echo = TRUE)
```

1. Initialization

```
m1 <- rbind(c(6, 4, 24),
            c(1, -9, 8))
#Result
m1
```

```
##      [,1] [,2] [,3]
## [1,]    6    4   24
## [2,]    1   -9    8
```

2. Addition

```
m.add.1 <- rbind(c(3, 8),
                 c(4, 6))
m.add.1
```

```
##      [,1] [,2]
## [1,]    3    8
## [2,]    4    6
```

```
m.add.2 <- rbind(c(4, 0),
                 c(1, -9))
m.add.2
```

```
##      [,1] [,2]
## [1,]    4    0
## [2,]    1   -9
```

```
#Result
m.add.1 + m.add.2
```

```
##      [,1] [,2]
## [1,]    7    8
## [2,]    5   -3
```

3. Negative

```
mat <- rbind(c(2, -4),
             c(7, 10))
mat
```

```
##      [,1] [,2]
## [1,]    2   -4
## [2,]    7   10
```

```
#Result
-1*mat
```

```
##      [,1] [,2]
## [1,]   -2    4
## [2,]   -7  -10
```

4. Subtraction

```
m.sub.1 <- rbind(c(3, 8),
                 c(4, 6))
m.sub.1
```

```
##      [,1] [,2]
## [1,]    3    8
## [2,]    4    6
```

```
m.sub.2 <- rbind(c(4, 0),
                 c(1, -9))
m.sub.2
```

```
##      [,1] [,2]
## [1,]    4    0
## [2,]    1   -9
```

```
#Result
m.sub.1 - m.sub.2
```

```
##      [,1] [,2]
## [1,]   -1    8
## [2,]    3   15
```

5. Multiplication by a constant

```
mat <- rbind(c(4, 0),
             c(1, -9))
mat
```

```
##      [,1] [,2]
## [1,]    4    0
## [2,]    1   -9
```

```
#Result
2*mat
```

```
##      [,1] [,2]
## [1,]    8    0
## [2,]    2  -18
```

6. Transpose

```
mat <- rbind(c(6, 4, 24),
             c(1, -9, 8))
mat
```

```
##      [,1] [,2] [,3]
## [1,]    6    4   24
## [2,]    1   -9    8
```

```
#Result
t(mat)
```

```
##      [,1] [,2]
## [1,]    6    1
## [2,]    4   -9
## [3,]   24    8
```

Multiplication

NOTE: To multiply an m x n matrix by an n x p matrix, the n's must be the same and the result will be an m x p matrix

1. Multiplying a matrix by another matrix

```
mat <- rbind(c(1, 2, 3),
             c(4, 5, 6))
mat
```

```
##      [,1] [,2] [,3]
## [1,]    1    2    3
## [2,]    4    5    6
```

```
mat1 <- rbind(c(7, 8),
              c(9, 10),
              c(11, 12))
mat1
```

```
##      [,1] [,2]
## [1,]    7    8
## [2,]    9   10
## [3,]   11   12
```

```
#Result
mat %*% mat1
```

```
##      [,1] [,2]
## [1,]   58   64
## [2,]  139  154
```

2. Getting the sales of pies

```
mat <- c(3, 4, 2)
mat
```

```
## [1] 3 4 2
```

```
mat1 <- rbind(c(13, 9, 7, 15),
              c(8, 7, 4, 6),
              c(6, 4, 0, 3))
mat1
```

```
##      [,1] [,2] [,3] [,4]
## [1,]   13    9    7   15
## [2,]    8    7    4    6
## [3,]    6    4    0    3
```

```
#Result
mat %*% mat1
```

```
##      [,1] [,2] [,3] [,4]
## [1,]   83   63   37   75
```

3. Rows and columns

The number of columns of the 1st matrix must equal the number of rows of the 2nd matrix. And the result will have the same number of rows as the 1st matrix, and the same number of columns as the 2nd matrix.

```
mat <- matrix(c(1,2,3), nrow=1, ncol=3)
mat1 <- matrix(c(4,5,6), nrow=3, ncol=1)
#Result
mat%*%mat1
```

```
##      [,1]
## [1,]   32
```

```
mat <- matrix(c(1,2,3), nrow=1, ncol=3)
mat1 <- matrix(c(4,5,6), nrow=3, ncol=1)
#Result
mat1%*%mat
```

```
##      [,1] [,2] [,3]
## [1,]    4    8   12
## [2,]    5   10   15
## [3,]    6   12   18
```

4. Order of multiplication

When the order of matrix multiplication changes, it usually leads to different results (i.e. A*B != B*A)

```
mat <- rbind(c(1, 2),
             c(3, 4))
mat1 <- rbind(c(2, 0),
             c(1, 2))
#Result
mat%*%mat1
```

```
##      [,1] [,2]
## [1,]    4    4
## [2,]   10    8
```

```
mat1%*%mat
```

```
##      [,1] [,2]
## [1,]    2    4
## [2,]    7   10
```