

Homework 2 Solutions, STATS 401 W18

Due in your lab on 1/18 or 1/19

Matrix exercises

```
A <- matrix(c(-2,-1,1,4),nrow=2)
B <- matrix(c(-3,4,4,1),nrow=2)
A
```

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

```
B
```

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

1. Addition.

```
A+B
```

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

2. Scalar multiplication.

```
2*A
```

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

3. Multiplying two square matrices.

```
A%*%B
```

```
##      [,1] [,2]
## [1,]  10  -7
## [2,]  19   0
```

4. Multiplying two rectangular matrices.

```
set.seed(2)
C <- matrix(sample(-10:10,6),nrow=2)
D <- matrix(sample(-10:10,6),nrow=3)
C;D;C%*%D
```

```
##      [,1] [,2] [,3]
## [1,]  -7   0   6
## [2,]   4  10   5

##      [,1] [,2]
## [1,]  -8  -1
## [2,]   6   7
## [3,]  -2  -7
```

```
##      [,1] [,2]
## [1,]  44 -35
## [2,]  18  31
```

5. Inverting a 2×2 matrix.

```
solve(A)
```

```
##      [,1] [,2]
## [1,] -0.5714286 0.1428571
## [2,] -0.1428571 0.2857143
```

6. Transposing a matrix.

```
C <- matrix(c(-3,1,4,2,-3,4),nrow=2)
C; t(C)
```

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

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

7. Solve the following system of linear equations using R.

$$\begin{aligned} -3w + x + y &= 2 \\ 3w + x + y + z &= 1 \\ -w - 3x + 3z &= -1 \\ -2w - 2x + 3z &= 4 \end{aligned}$$

```
A <- matrix(c(-3,3,-1,2,1,1,-3,-2,1,1,0,0,0,1,3,3),nrow=4)
b <- c(2,1,-1,4)
x = solve(A)%*%b
x
```

```
##      [,1]
## [1,] -1.7
## [2,] 10.1
## [3,] -13.2
## [4,]  9.2
```