Class Prep 7: 3.2.1

# Chapter 3: Linear Algebra

## Section 3.1.1: Matrix and Vector Operations

library(cmna)  
library(pracma)

##   
## Attaching package: 'pracma'

## The following objects are masked from 'package:cmna':  
##   
## cubicspline, horner, newton, nthroot, romberg, secant, wilkinson

u <- c(1, 2, 3); v <- c(8, 4, 2); x <- 7  
u + x

## [1] 8 9 10

u + v

## [1] 9 6 5

u + c(1,9)

## Warning in u + c(1, 9): longer object length is not a multiple of shorter object  
## length

## [1] 2 11 4

A <- matrix(1:9, 3)  
A + 1

## [,1] [,2] [,3]  
## [1,] 2 5 8  
## [2,] 3 6 9  
## [3,] 4 7 10

A + c(1, 2, 3)

## [,1] [,2] [,3]  
## [1,] 2 5 8  
## [2,] 4 7 10  
## [3,] 6 9 12

A + 1

## [,1] [,2] [,3]  
## [1,] 2 5 8  
## [2,] 3 6 9  
## [3,] 4 7 10

A + c(1, 2) - A

## Warning in A + c(1, 2): longer object length is not a multiple of shorter object  
## length

## [,1] [,2] [,3]  
## [1,] 1 2 1  
## [2,] 2 1 2  
## [3,] 1 2 1

A + c(1, 2, 3) - A

## [,1] [,2] [,3]  
## [1,] 1 1 1  
## [2,] 2 2 2  
## [3,] 3 3 3

B <- matrix(1:6, 3)  
status <- try(A + B)

## Error in A + B : non-conformable arrays

print(status[1])

## [1] "Error in A + B : non-conformable arrays\n"

A %\*% B

## [,1] [,2]  
## [1,] 30 66  
## [2,] 36 81  
## [3,] 42 96

u %\*% v

## [,1]  
## [1,] 22

diag(A)

## [1] 1 5 9

diag(B)

## [1] 1 5

diag(u)

## [,1] [,2] [,3]  
## [1,] 1 0 0  
## [2,] 0 2 0  
## [3,] 0 0 3

diag(1, 4)

## [,1] [,2] [,3] [,4]  
## [1,] 1 0 0 0  
## [2,] 0 1 0 0  
## [3,] 0 0 1 0  
## [4,] 0 0 0 1

nrow(B)

## [1] 3

ncol(B)

## [1] 2

nrow(u)

## NULL

ncol(u)

## NULL

length(u)

## [1] 3

length(B)

## [1] 6

dim(B)

## [1] 3 2

## Section 3.1.2: Elementary Row Operations

A <- matrix(1:15, 5)  
scalerow(A, 2, 10)

## [,1] [,2] [,3]  
## [1,] 1 6 11  
## [2,] 20 70 120  
## [3,] 3 8 13  
## [4,] 4 9 14  
## [5,] 5 10 15

swaprows(A, 1, 4)

## [,1] [,2] [,3]  
## [1,] 4 9 14  
## [2,] 2 7 12  
## [3,] 3 8 13  
## [4,] 1 6 11  
## [5,] 5 10 15

replacerow(A, 1, 3, -3)

## [,1] [,2] [,3]  
## [1,] 1 6 11  
## [2,] 2 7 12  
## [3,] 0 -10 -20  
## [4,] 4 9 14  
## [5,] 5 10 15