Matrix Algebra Review

Econ 424/Amath 540
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```
> matA = matrix(data=c(1,2,3,4,5,6),nrow=2,ncol=3)
> matA
     [,1] [,2] [,3]
[1,]    1    3    5
[2,]    2    4    6

> class(matA)
[1] "matrix"

> dim(matA)
[1] 2 3

> xvec = c(1,2,3)
> xvec
[1] 1 2 3

> class(xvec)
[1] "numeric"
```

```
> xvec.mat = as.matrix(xvec)

> xvec.mat
     [,1]
[1,]    1
[2,]    2
[3,]    3

> class(xvec.mat)
[1] "matrix“

> t(matA)
     [,1] [,2]
[1,]    1    2
[2,]    3    4
[3,]    5    6

> t(xvec.mat)
     [,1] [,2] [,3]
[1,]    1    2    3
```



```
> matS = matrix(c(1,2,2,1),2,2)

> matS
     [,1] [,2]
[1,]    1    2
[2,]    2    1

# check for symmetry

> matS == t(matS)
     [,1] [,2]
[1,] TRUE TRUE
[2,] TRUE TRUE
```

```
> matA = matrix(c(4,9,2,1),2,2,byrow=T)
> matB = matrix(c(2,0,0,7),2,2,byrow=T)
> matA
     [,1] [,2]
[1,]    4    9
[2,]    2    1
> matB
     [,1] [,2]
[1,]    2    0
[2,]    0    7

> matC = matA + matB
> matC
     [,1] [,2]
[1,]    6    9
[2,]    2    8

> matC = matA - matB
> matC
     [,1] [,2]
[1,]    2    9
[2,]    2   -6
```



```
> matA = matrix(1:4,2,2,byrow=T)
> matB = matrix(5:8,2,2,byrow=T)
> matA
     [,1] [,2]
[1,]    1    2
[2,]    3    4
> matB
     [,1] [,2]
[1,]    5    6
[2,]    7    8

> matC = matA%*%matB
> matC
     [,1] [,2]
[1,]   19   22
[2,]   43   50
```

```
# create identity matrix
> matI = diag(2)
> matI
     [,1] [,2]
[1,]    1    0
[2,]    0    1

> matI%*%matA
     [,1] [,2]
[1,]    1    2
[2,]    3    4

> matA%*%matI
     [,1] [,2]
[1,]    1    2
[2,]    3    4
```



```
# matrix inversion
> matA
     [,1] [,2]
[1,]    1    2
[2,]    3    4

> matA.inv = solve(matA)
> matA.inv
     [,1] [,2]
[1,] -2.0  1.0
[2,]  1.5 -0.5

> matA%*%matA.inv
     [,1]         [,2]
[1,]    1 1.110223e-16
[2,]    0 1.000000e+00

> matA.inv%*%matA
              [,1] [,2]
[1,] 1.000000e+00    0
[2,] 1.110223e-16    1
```