Assignment 3

Ben Arancibia

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Problem Set 1

Question 1

Rank of Matrix A is 4 since there are 4 linearly indepedent rows. None of the rows can be written as a linear combination(quick explanation of linear independence for my reference: http://en.wikipedia.org/wiki/Linear_independence).

Question 2

Given an mxn matrix where m > n then the maximum rank is n, you cannot have more than n linearly independent rows since m > n. Assuming matrix is a non-zero, the minimum rank is 1.

Question 3

The rank of matrix B is 1.

```
##### Question 3 #####
m2 <- matrix(c(1,2,1,
               3,6,3,
               2,4,2), byrow=T, nrow=3)
rankMatrix(m2)[1]
```

```
## [1] 1
```

```
rref(m2)
```

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

Problem set 2

```
A <- matrix(c(1,2,3,0,4,5,0,0,6), byrow=T, nrow=3)
# Because this matrix is in upper triangular form, the eigenvalues are simply the diagonals: 6, 4, 1
eigen(A)$values
```

```
## [1] 6 4 1
```

```r
eigen(A)$vectors
```

```
##         [,1]   [,2] [,3]
## [1,] 0.5108 0.5547    1
## [2,] 0.7982 0.8321    0
## [3,] 0.3193 0.0000    0
```