HW3 Linear Algebra

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Problem Set 1

R Q1.

Solution.

```
A <- matrix(c(1, -1, 0, 5, 2, 0, 1, 4, 3, 1, -2, -2, 4, 3, 1, -3), nrow = 4,ncol = 4)
print(A)
```

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

```
r<-Matrix::rankMatrix(A)
sprintf('Rank of the matrix A is %d', r)
```

```
## [1] "Rank of the matrix A is 4"
```

Q.2

Answer. It's given that the number of rows m is greater than number of columns n i.e., m>n. We know that rank(A)≤ min{m, n} Since n < m therefore min{m, n}=n Hence, maximum rank of matrix such that m>n is n. and the minimum possible rank of any non-zero matrix is 1 but rank of a null matrix is zero.

Q3.

```
B <- matrix(c(1, 3, 2, 2, 6, 4, 1, 3, 2), nrow = 3, ncol = 3)
print(B)
```

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

```
rB<-Matrix::rankMatrix(B)
sprintf('Rank of the matrix B is %d', rB)
```

```
## [1] "Rank of the matrix B is 1"
```

Problem Set 2

Q3.

```
A<- matrix(c(1, 0, 0, 2, 4, 0, 3, 5, 6), nrow = 3, ncol = 3)
A
```

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

```
eig_values <- eigen(A)
print("Eigen values are :")
```

```
## [1] "Eigen values are :"
```

```
print(eig_values[1])
```

```
## $values
## [1] 6 4 1
```