Lecture5 Tutorial Exercises

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```
library(matlib)
```

Exercise 3.3.1

c

```
A = matrix(c(7, 0, -4, 0, 5, 0, 5, 0, -2), nrow = 3, byrow = TRUE)
e_values = eigen(A)$values
e_values
```

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

```
n = length(e_values)
nrow_ = nrow(A)
b = replicate(nrow_, 0)
for (i in 1:n){
  C = e_values[i]*diag(nrow_)-A
  i_vector = gaussianElimination(C, b)
  print(i_vector)
}
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    0    0    0
## [2,]    0    0    1    0
## [3,]    0    0    0    0
##      [,1] [,2] [,3] [,4]
## [1,]    1    0   -1    0
## [2,]    0    1    0    0
## [3,]    0    0    0    0
##      [,1] [,2] [,3] [,4]
## [1,]    1    0 -0.8    0
## [2,]    0    1  0.0    0
## [3,]    0    0  0.0    0
```

d

```
A = matrix(c(1, 1, -3, 2, 0, 6, 1, -1, 5), nrow = 3, byrow = TRUE)
e_values = eigen(A)$values
e_values
```

```
## [1] 2 2 2
```

```
n = length(e_values)
nrow_ = nrow(A)
b = replicate(nrow_, 0)
for (i in 1:n){
  C = e_values[i]*diag(nrow_)-A
  print(C)
  i_vector = gaussianElimination(C, b)
  print(i_vector)
}
```

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

e

```
A = matrix(c(1, -2, 3, 2, 6, -6, 1, 2, -1), nrow = 3, byrow = TRUE)
e_values = eigen(A)$values
e_values
```

```
## [1] 2+0i 2-0i 2+0i
```

f

```
A = matrix(c(0, 1, 0, 3, 0, 1, 2, 0, 0), nrow = 3, byrow = TRUE)
e_values = eigen(A)$values
e_values
```

```
## [1]  2 -1 -1
```

```
n = length(e_values)
nrow_ = nrow(A)
b = replicate(nrow_, 0)
for (i in 1:n){
  C = e_values[i]*diag(nrow_)-A
  i_vector = gaussianElimination(C, b)
  print(i_vector)
}
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    0   -1    0
## [2,]    0    1   -2    0
## [3,]    0    0    0    0
##      [,1] [,2] [,3] [,4]
## [1,]    1    0  0.5    0
## [2,]    0    1 -0.5    0
## [3,]    0    0  0.0    0
##      [,1] [,2] [,3] [,4]
## [1,]    1    0  0.5    0
## [2,]    0    1 -0.5    0
## [3,]    0    0  0.0    0
```