

# Lecture2 Tutorial Exercises

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## Exercise 2.3.25

```
A = matrix(c(12, 2, 21, 3, 10, 2), nrow = 3, byrow = TRUE)
B = matrix(c(21, 18, 20, 14, 10, 13), nrow = 2, byrow = TRUE)
A %*% B # (3, 2) means the total cost of product hoods by Plan2
```

```
##      [,1] [,2] [,3]
## [1,]  280  236  266
## [2,]  483  408  459
## [3,]  238  200  226
```

```
which.min(colSums(A %*% B)) # Plan2 is the most economical
```

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

```
library(matlib)
```

## Exercise 1.2.5 a

```
A = matrix(c(1, 1, 2, 3, -1, 1, -1, 3, 4), nrow = 3, byrow = TRUE)
b = c(8, 0, 4)
gaussianElimination(A, b)
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    0    0    11
## [2,]    0    1    0    21
## [3,]    0    0    1   -12
```

## Exercise 1.2.5 b

```
A = matrix(c(-2, 3, 3, 3, -4, 1, -5, 7, 2), nrow = 3, byrow = TRUE)
b = c(-9, 5, -14)
gaussianElimination(A, b)
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    0   15  -21
## [2,]    0    1   11  -17
## [3,]    0    0    0    0
```

## Exercise 1.2.5 d

```
A = matrix(c(1, 2, -1, 2, 5, -3, 1, 4, -3), nrow = 3, byrow = TRUE)
b = c(2, 1, 3)
gaussianElimination(A, b)
```

```
##      [,1] [,2] [,3]      [,4]
## [1,]    1    0    1 -3.666667
## [2,]    0    1   -1  1.666667
## [3,]    0    0    0  2.333333
```

## Exercise 1.2.5 f

```
A = matrix(c(3, -2, 1, 1, -1, 3, -1, 1, 1), nrow = 3, byrow = TRUE)
b = c(-2, 5, -1)
gaussianElimination(A, b)
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    0    0   -7
## [2,]    0    1    0   -9
## [3,]    0    0    1    1
```

## Exercise 1.2.7 a

```
A = matrix(c(3, 8, -3, -14, 2, 3, -1, -2, 1, -2, 1, 10, 1, 5, -2, -12), nrow = 4, byrow = TRUE)
b = c(2, 1, 0, 1)
gaussianElimination(A, b)
```

```
##      [,1] [,2]      [,3]      [,4]      [,5]
## [1,]    1    0  0.1428571  3.714286  0.2857143
## [2,]    0    1 -0.4285714 -3.142857  0.1428571
## [3,]    0    0  0.0000000  0.000000  0.0000000
## [4,]    0    0  0.0000000  0.000000  0.0000000
```

## Exercise 1.2.7 b

```
A = matrix(c(1, -1, 1, -1, -1, 1, 1, 1, 1, 1, -1, 1, 1, 1, 1, 1), nrow = 4, byrow = TRUE)
b = c(0, 0, 0, 0)
gaussianElimination(A, b)
```

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

## Exercise 1.2.7 c

```
A = matrix(c(1, -1, 1, -2, -1, 1, 1, 1, -1, 2, 3, -1, 1, -1, 2, 1), nrow = 4, byrow = TRUE)
b = c(1, -1, 2, 1)
gaussianElimination(A, b)
```

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