

## Tartalomjegyzék

- 1 MatLab
  - ◆ 1.1 Magic Matrix (3 points)
  - ◆ 1.2 Elimination (3 points)
  - ◆ 1.3 Deadline

## MatLab

6 points

The task is to write two matlab functions, each in one .m file. You have to attach these files to your email. The name of the files should be the same as the functions.

### Magic Matrix (3 points)

Write a `magicmatrix` function that has two arguments: two positive integers  $n$  and  $m$ . The result should be a  $n \times m$  matrix with 0 and 1 values of a pattern where two ones are next to each other and the pattern goes diagonally up and right (two to the right, one upwards). This pattern should begin at every third line.

Example:

```
>> magicmatrix(12,10)
 1  1  0  0  0  0  1  1  0  0  0
 0  0  0  0  1  1  0  0  0  0  1
 0  0  1  1  0  0  0  0  1  1  0
 1  1  0  0  0  0  1  1  0  0  0
 0  0  0  0  1  1  0  0  0  0  1
 0  0  1  1  0  0  0  0  1  1  0
 1  1  0  0  0  0  1  1  0  0  0
 0  0  0  0  1  1  0  0  0  0  1
 0  0  1  1  0  0  0  0  1  1  0
 1  1  0  0  0  0  1  1  0  0  0
 0  0  0  0  1  1  0  0  0  0  1
 0  0  1  1  0  0  0  0  1  1  0
```

### Elimination (3 points)

Write a function called `eliminate` with four arguments:

- a matrix  $M$
- and three positive integers:  $i, j, k$

The three integers mean two row indices and one column index. The function should return a matrix with the same size as  $M$ , but the  $j^{\text{th}}$  row  $k^{\text{th}}$  column element should be zeroed out with the  $i^{\text{th}}$  row  $k^{\text{th}}$  element. As part of the Gaussian elimination.

Example

## Informatics1-2019/HW6

```
M =
  1     2     3
  4     5     6
  7     8     9
>> eliminate(M, 1, 2, 1)
ans =
  1     2     3
  0    -3    -6
  7     8     9
>> eliminate(eliminate(M, 1, 2, 1), 1, 3, 1)
ans =
  1     2     3
  0    -3    -6
  0    -6   -12
>> eliminate(eliminate(eliminate(M, 1, 2, 1), 1, 3, 1), 2, 3, 2)
ans =
  1     2     3
  0     1     2
  0     0     0
>> eliminate(eliminate(eliminate(eliminate(M, 1, 2, 1), 1, 3, 1), 2, 3, 2), 3, 2, 3)
ans =
  1     2     3
  0     1     2
  0     0     0
>> eliminate(eliminate(eliminate(eliminate(M, 1, 2, 1), 1, 3, 1), 2, 3, 2), 2, 1, 2)
ans =
  1     0    -1
  0     1     2
  0     0     0
```

- If the  $i^{\text{th}}$  row  $k^{\text{th}}$  element is zero, then return the original matrix.
- If not, then
  - ◆ Divide the  $i^{\text{th}}$  row such that the  $k^{\text{th}}$  element becomes 1
  - ◆ subtract the multiple of the new  $i^{\text{th}}$  from the  $j^{\text{th}}$  row such that the  $k^{\text{th}}$  element in that row becomes 0

## Deadline

2019 December 8<sup>th</sup>, 23:59