



## EX1(A): Gaussian Elimination

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### Problem description

In this task you are to find an inverse of a matrix using [Gaussian elimination](#): Given a square matrix  $A$ , through application of elementary row operations bring the matrix  $[A|I]$  to the form  $[I|A^{-1}]$ . If the matrix is degenerate you are to bring the matrix to the form where there is at least one zero row.

As input the program receives the dimension of the matrix as the first number, followed by the matrix. As a solution, you are to provide a sequence of the elementary operations required to find the inverse matrix, as well as the inverse matrix itself.

First report the sequence of the operations, one in a row.

- to swap to rows output `S <row index> <row index>`.
- to multiply the row with a number output `M <row index> <number>`.
- to add a multiple of one row to another row ( $A_i = A_i + A_j * s$ ) output `A <row index i> <row index j> <scalar>`.

Be aware that the rows are indexed starting with zero. **Output sufficient number of significant digits.**

After reporting the sequence of operation output your verdict on a separate line:

- `DEGENERATE` if you have successfully turned the matrix into a from with a zero row.
- `SOLUTION` if you turned the matrix into the  $[I|A^{-1}]$  form.

Finally, if you found the inverse, output it on a new line.

### Sample input/output

Sample input and output for this problem:

Input	Output
5 1 0 0 0 0 0 1 0 0 0 0 2 1 0 0 0 0 3 1 0 0 0 0 1 1	A 2 1 -2 A 3 2 -3 A 4 3 -1 SOLUTION 1 0 0 0 0 0 1 0 0 0 0 -2 1 0 0 0 6 -3 1 0 0 -6 3 -1 1
5 1 0 0 0 0 0 1 0 0 0 0 0 3 3 0 0 1 2 2 0 0 0 0 0 1	A 3 1 -1 M 2 0.33333333333333331483 A 3 2 -2 S 3 4 DEGENERATE