#include <stdio.h>

#include <stdlib.h>

void createIdentityMatrix(double \*matrix, int rows, int cols) {

int i, j;

for (i = 0; i < rows; i++) {

for (j = 0; j < cols; j++) {

if (i == j) {

\*(matrix + i\*cols + j) = 1;

} else {

\*(matrix + i\*cols + j) = 0;

}

}

}

}

void multiplyMatrixByScalar(double \*matrix, int rows, int cols, double scalar){

int i, j;

for (i = 0; i < rows; i++) {

for (j = 0; j < cols; j++) {

\*(matrix + i\*cols + j) \*= scalar;

}

}

}

void swapRows(double \*matrix, int rows, int cols, int row1, int row2){

int i;

double temp;

if (row1 < 0 || row1 >= rows || row2 < 0 || row2 >= rows) {

printf("Ungueltige Zeilen\n");

return;

}

for (i = 0; i < cols; i++) {

temp = \*(matrix + row1\*cols + i);

\*(matrix + row1\*cols + i) = \*(matrix + row2\*cols + i);

\*(matrix + row2\*cols + i) = temp;

}

}

void swapCols(double \*matrix, int rows, int cols, int col1, int col2) {

int i;

double temp;

if (col1 < 0 || col1 >= cols || col2 < 0 || col2 >= cols) {

printf("Ungueltige Spalten\n");

return;

}

for (i = 0; i < rows; i++) {

temp = \*(matrix + i\*cols + col1);

\*(matrix + i\*cols + col1) = \*(matrix + i\*cols + col2);

\*(matrix + i\*cols + col2) = temp;

}

}

void changeMatrixSize(double \*\*matrix, int \*rows, int \*cols) {

int newRows, newCols;

double \*newMatrix;

printf("Neue Anzahl von Zeilen und Spalten eingeben: ");

scanf("%d%d", &newRows, &newCols);

newMatrix = (double \*)malloc(newRows \* newCols \* sizeof(double));

createIdentityMatrix(newMatrix, newRows, newCols);

free(\*matrix);

\*matrix = newMatrix;

\*rows = newRows;

\*cols = newCols;

}

int main(void) {

int rows, cols;

int row1, row2;

int col1, col2;

int i, j;

double scalar;

double \*matrix;

printf("Anzahl von Zeilen und Spalten eingeben: ");

scanf("%d%d", &rows, &cols);

matrix = (double \*)malloc(rows \* cols \* sizeof(double));

createIdentityMatrix(matrix, rows, cols);

printf("Faktor zum multiplizeiren eingeben: ");

scanf("%lf", &scalar);

multiplyMatrixByScalar(matrix, rows, cols, scalar);

printf("Zeilen die getauscht werden sollen eingeben: ");

scanf("%d%d", &row1, &row2);

/\*cheeky ich weiß :)\*/

row1 -= 1;

row2 -= 1;

swapRows(matrix, rows, cols, row1, row2);

printf("Spalten die getauscht werden sollen eingeben: ");

scanf("%d%d", &col1, &col2);

col1 -= 1;

col2 -= 1;

swapCols(matrix, rows, cols, col1, col2);

printf("Die Matrix ist: \n");

for (i = 0; i < rows; i++) {

for (j = 0; j < cols; j++) {

printf("%.2lf ", \*(matrix + i\*cols + j));

}

printf("\n");

}

changeMatrixSize(&matrix, &rows, &cols);

multiplyMatrixByScalar(matrix, rows, cols, scalar);

swapRows(matrix, rows, cols, row1, row2);

swapCols(matrix, rows, cols, col1, col2);

printf("Die Matrix nach änderung ist: \n");

for (i = 0; i < rows; i++){

for (j = 0; j < cols; j++) {

printf("%.2lf ", \*(matrix + i\*cols + j));

}

printf("\n");

}

free(matrix);

return 0;

}