#include <iostream>

#include<iomanip>

#include <windows.h>

using namespace std;

//İkiölçülü massivlər

//Task 1

//1. 5x5 ölçüsündə ikiölçülü massivi 0 - 20 aralığında random ədədlərlə

//doldurun. Massivdəki ədədlərin cəmini tapın.

void task1()

{

// Creating Headline

cout << "\n Task 1" << endl;

cout << "\n The program calculates the sum of the number in a two-dimensional (2D) array." << endl;

cout << "---------------------------------------------------------------------------------" << endl;

// Creating the length of columns and rows of the 2D array

const int row = 5;

const int col = 5;

// Creating 2D array

int myArray[row][col] = {};

// Determining the maximum and minimum of a random numbers

srand(time(0));

int min = 1;

int max = 20;

// Filling the 2D array with the random numbers

int random = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

random = min + rand() % (max - min);

myArray[r][c] = random;

}

}

// Printing the 2D array

cout << "\n My 2D Array : " << endl;

for (int r = 0; r < row; r++)

{

if (r == 0)

cout << " \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_" << endl;

else

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

cout << " ";

for (int c = 0; c < col; c++)

{

cout << "|" << setw(3) << myArray[r][c];

}

cout << "|" << endl;

}

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

// Calculating the sum of all the numbers

int sum = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

sum += myArray[r][c];

}

}

// Answer

cout << "\n The sum of all numbers in the 2D array is equal to " << sum << "." << endl;

}

//Task 2

//2. 5x5 ölçüsündə ikiölçülü massivi 0-20 aralığında random ədədlərlə

//doldurun.Əsas və əks dioqanalda yerləşən rəqəmlərin cəmini

//hesablayan program yazın

void task2()

{

// Creating Headline

cout << "\n Task 2" << endl;

cout << "\n The program calculates the sum of the numbers in the diagonals of a 2D array." << endl;

cout << "-------------------------------------------------------------------------------" << endl;

// Creating the length of rows and columns of the 2D array

const int row = 5;

const int col = 5;

// Creating 2D array

int myArray[row][col] = {};

// Determining the maximum and minimum of the random numbers

srand(time(0));

int min = 1;

int max = 20;

// Filling the 2D array with the random numbers

int random = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

random = min + rand() % (max - min);

myArray[r][c] = random;

}

}

// Printing the 2D array

cout << "\n My 2D Array : " << endl;

for (int r = 0; r < row; r++)

{

if (r == 0)

cout << " \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_" << endl;

else

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

cout << " ";

for (int c = 0; c < col; c++)

{

cout << "|" << setw(3) << myArray[r][c];

}

cout << "|" << endl;

}

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

// Finding the sum of the numbers in the digonals

// Version 1

// Calculates the number in the middle for once

int sum = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

if (r == c || r + c == row - 1)

sum += myArray[r][c];

}

}

// Version 2

// Calculates the number in the middle for twice

int sum2 = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

if (r == c)

sum2 += myArray[r][c];

if (r + c == row - 1)

sum2 += myArray[r][c];

}

}

// Answers

cout << "\n The sum of the numbers in the diagonals is equal to " << sum << ", if the number in the middle calculated for once." << endl;

cout << "\n The sum of the numbers in the diagonals is equal to " << sum2 << ", if the number in the middle calculated for twice." << endl;

}

//Task 3

//3. 5x5 ölçüsündə ikiölçülü massivi(-100) və(100) aralığında random

//ədədlərlə doldurun.Massivdəki minimal və maksimal elementləri

//tapan program yazın.

void task3()

{

// Creating Headline

cout << "\n Task 3" << endl;

cout << "\n The program finds the minimum and maximum number in a 2D array." << endl;

cout << "-----------------------------------------------------------------" << endl;

// Creating the length of rows and columns of the 2D array

const int row = 5;

const int col = 5;

// Creating 2D array

int myArray[row][col] = {};

// Determining the maximum and minimum of the random numbers

srand(time(0));

int min = -99;

int max = 99;

// Filling the 2D array with the random numbers

int random = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

random = min + rand() % (max - min);

myArray[r][c] = random;

}

}

// Printing the 2D array

cout << "\n My 2D Array : " << endl;

for (int r = 0; r < row; r++)

{

if (r == 0)

cout << " \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_" << endl;

else

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

cout << " ";

for (int c = 0; c < col; c++)

{

cout << "|" << setw(3) << myArray[r][c];

}

cout << "|" << endl;

}

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

// Finding the minimum and maximum number

int maximum = -101;

int minimum = 101;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

if (myArray[r][c] >= maximum)

maximum = myArray[r][c];

if (myArray[r][c] <= minimum)

minimum = myArray[r][c];

}

}

// Answers

cout << "\n The maximum number of the 2D array is " << maximum << "." << endl;

cout << "\n The minimum number of the 2D array is " << minimum << "." << endl;

}

//Task 4

//4. 5x5 ölçüsündə ikiölçülü massivi -5 və 5aralığında random ədədlərlə

//oldurun.Massivdəki mənfi, müsbət, və sıfır olan elementlərin sayını

//tapın.

void task4()

{

//Creating Headline

cout << "\n Task 4" << endl;

cout << "\n The program finds the number of negative, positive numbers and zeros in a 2D array." << endl;

cout << "-------------------------------------------------------------------------------------" << endl;

// Creating the length of rows and columns of the 2D array

const int row = 5;

const int col = 5;

// Creating 2D array

int myArray[row][col] = {};

// Determining the maximum and minimum of the random numbers

srand(time(0));

int min = -5;

int max = 5;

// Filling the 2D array with the random numbers

int random = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

random = min + rand() % (max - min);

myArray[r][c] = random;

}

}

// Printing the 2D array

cout << "\n My 2D Array : " << endl;

for (int r = 0; r < row; r++)

{

if (r == 0)

cout << " \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_" << endl;

else

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

cout << " ";

for (int c = 0; c < col; c++)

{

cout << "|" << setw(3) << myArray[r][c];

}

cout << "|" << endl;

}

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

// Creating arrays for the positive and negative numbers, and zeros

const int size = row \* col;

int positiveN[size] = {};

int negativeN[size] = {};

int zeroN[size] = {};

// Finding the number of negative, positive numbers and zeros in the 2D array

int positiveCounter = 0;

int negativeCounter = 0;

int zeroCounter = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

if (myArray[r][c] > 0)

{

positiveN[positiveCounter] = myArray[r][c];

positiveCounter++;

}

else if (myArray[r][c] < 0)

{

negativeN[negativeCounter] = myArray[r][c];

negativeCounter++;

}

else

{

zeroN[zeroCounter] = myArray[r][c];

zeroCounter++;

}

}

}

// Answers

string answer = " ";

if (positiveCounter != 0)

{

if (positiveCounter == 1)

answer = " It is ";

else

answer = " They are ";

cout << "\n The number of positive numbers is " << positiveCounter << "." << endl;

cout << answer;

for (int p = 0; p < positiveCounter; p++)

{

cout << positiveN[p] << ", ";

}

cout << "\b\b." << endl;

}

else

cout << "\n There are not negative numbers in the 2D array." << endl;

if (negativeCounter != 0)

{

if (negativeCounter == 1)

answer = " It is ";

else

answer = " They are ";

cout << "\n The number of negative numbers is " << negativeCounter << "." << endl;

cout << answer;

for (int n = 0; n < negativeCounter; n++)

{

cout << negativeN[n] << ", ";

}

cout << "\b\b." << endl;

}

else

cout << "\n There are not positive numbers in the 2D array." << endl;

if (zeroCounter != 0)

{

if (zeroCounter == 1)

answer = " It is ";

else

answer = " They are ";

cout << "\n The number of zeros is " << zeroCounter << "." << endl;

cout << answer;

for (int z = 0; z < zeroCounter; z++)

{

cout << zeroN[z] << ", ";

}

cout << "\b\b." << endl;

}

else

cout << "\n There is not zero in the 2D array." << endl;

}

//Task 5

//5. 5x5 ölçüsündə ikiölçülü massivi 0-20 aralığında random ədədlərlə

//doldurun.Hər bir sətirdəki elementlərin cəmini tapın.

void task5()

{

//Creating Headline

cout << "\n Task 5" << endl;

cout << "\n The program finds the sum of the numbers in each line of the 2D array." << endl;

cout << "------------------------------------------------------------------------" << endl;

// Creating the length of rows and columns of the 2D array

const int row = 5;

const int col = 5;

// Creating 2D array

int myArray[row][col] = {};

// Determining the maximum and minimum of the random numbers

srand(time(0));

int min = 0;

int max = 20;

// Filling the 2D array with the random numbers

int random = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

random = min + rand() % (max - min);

myArray[r][c] = random;

}

}

// Printing the 2D array

cout << "\n My 2D Array : " << endl;

for (int r = 0; r < row; r++)

{

if (r == 0)

cout << " \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_" << endl;

else

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

cout << " ";

for (int c = 0; c < col; c++)

{

cout << "|" << setw(3) << myArray[r][c];

}

cout << "|" << endl;

}

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

// Answer

// Finding the sum of the numbers in each line of the 2D array

int sum = 0;

for (int r = 0; r < row; r++)

{

int sum = 0;

for (int c = 0; c < col; c++)

{

sum += myArray[r][c];

}

cout << "\n The sum of the numbers in the line " << r+1 << " is " << sum << "." << endl;

}

}

//Task 6

//6. 5x5 ölçüsündə ikiölçülü massivi 0-20 aralığında random ədədlərlə

//doldurun.Hər bir sütundakı elementlərin cəmini tapın.

void task6()

{

//Creating Headline

cout << "\n Task 6" << endl;

cout << "\n The program finds the sum of the numbers in each column of the 2D array." << endl;

cout << "--------------------------------------------------------------------------" << endl;

// Creating the length of rows and columns of the 2D array

const int row = 5;

const int col = 5;

// Creating 2D array

int myArray[row][col] = {};

// Determining the maximum and minimum of the random numbers

srand(time(0));

int min = 0;

int max = 20;

// Filling the 2D array with the random numbers

int random = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

random = min + rand() % (max - min);

myArray[r][c] = random;

}

}

// Printing the 2D array

cout << "\n My 2D Array : " << endl;

for (int r = 0; r < row; r++)

{

if (r == 0)

cout << " \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_" << endl;

else

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

cout << " ";

for (int c = 0; c < col; c++)

{

cout << "|" << setw(3) << myArray[r][c];

}

cout << "|" << endl;

}

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

// Answers

// Finding the sum of the numbers in each column of the 2D array

int sum = 0;

for (int c = 0; c < col; c++)

{

int sum = 0;

for (int r = 0; r < row; r++)

{

sum += myArray[r][c];

}

cout << "\n The sum of the numbers in the column " << c+1 << " is " << sum << "." << endl;

}

}

//Task 7

//7. 5x5 ölçüsündə ikiölçülü massivi - 10 və 40 aralığında random

//ədədlərlə doldurun.Bütün sətirdə mənfi ədəd yoxdursa, bu sətirin

//cəmini toplayın.

void task7()

{

//Creating Headline

cout << "\n Task 7" << endl;

cout << "\n If there is not negative number in a line, the program calculates the sum of the numbers in this line of the 2D array." << endl;

cout << "------------------------------------------------------------------------------------------------------------------------" << endl;

// Creating the length of rows and columns of the 2D array

const int row = 5;

const int col = 5;

// Creating 2D array

int myArray[row][col] = {};

// Determining the maximum and minimum of the random numbers

srand(time(0));

int min = -10;

int max = 40;

// Filling the 2D array with the random numbers

int random = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

random = min + rand() % (max - min);

myArray[r][c] = random;

}

}

// Printing the 2D array

cout << "\n My 2D Array : " << endl;

for (int r = 0; r < row; r++)

{

if (r == 0)

cout << " \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_" << endl;

else

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

cout << " ";

for (int c = 0; c < col; c++)

{

cout << "|" << setw(3) << myArray[r][c];

}

cout << "|" << endl;

}

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

// Answers

// Calculating the sum of the numbers in the line, if there is not negative number in a line

bool hasNegative = false;

int sum = 0;

for (int r = 0; r < row; r++)

{

int sum = 0;

bool hasNegative = false;

for (int c = 0; c < col; c++)

{

if (myArray[r][c] > -1)

sum += myArray[r][c];

else

{

hasNegative = true;

break;

}

}

if (hasNegative == false)

cout << "\n The sum of the numbers in the line " << r + 1 << " is " << sum << "." << endl;

}

}

//Task 8

//8. N x M ölçülü massivi elə ikirəqəmli ədədlərlə doldurun ki, birinci

//rəqəm sətirin, ikinci rəqəm sütuun nömrəsini göstərsin.

void task8()

{

// Creating Haedline

cout << "\n Task 8" << endl;

cout << "\n The program displays row and column number of all coordinates." << endl;

cout << "----------------------------------------------------------------" << endl;

// Inputs

int r = 0;

cout << "\n Enter the length of row : ";

cin >> r;

int c = 0;

cout << "\n Enter the length of column : ";

cin >> c;

// Variables

int const row = r;

int const col = c;

// Result

cout << "\n " << r << "x" << c << " 2D array : " << endl;

cout << "\n";

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

if (r+1 > 9)

cout << setw(5) << string(1, '\b') << "(" << r + 1 << ";" << c + 1 << ")";

else

cout << setw(5) << "(" << r + 1 << ";" << c + 1 << ")";

}

cout << endl;

}

}

//Task 9

//9. N xM ölçülü massivdə, birinci və sonuncu sütunun, ikinci və sondan

//əvvəlki sütunun və s.yerini dəyişin

void task9()

{

// Creating Haedline

cout << "\n Task 9" << endl;

cout << "\n The program changes the location of the first and last column, the second and the last second column, and so on." << endl;

cout << "------------------------------------------------------------------------------------------------------------------" << endl;

// Variables

int const row = 5;

int const col = 5;

// Creating 2D array

int myArray[row][col] = {};

// Determining the maximum and minimum of the random numbers

srand(time(0));

int min = 0;

int max = 20;

// Filling the 2D array with the random numbers

int random = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

random = min + rand() % (max - min);

myArray[r][c] = random;

}

}

// Printing the 2D array

cout << "\n My 2D Array : " << endl;

cout << "\n";

for (int r = 0; r < row; r++)

{

cout << " ";

for (int c = 0; c < col; c++)

{

cout << setw(5) << myArray[r][c];

}

cout << endl;

}

// Changing the location of the first and last column, the second and the last second column, and so on

int myArray2[row][col] = {};

for (int c = 0; c < col ; c++)

{

for (int r = 0; r < row; r++)

{

myArray2[r][c] = myArray[r][col - (c + 1)];

}

}

// Printing the Changed 2D array

cout << "\n My Changed 2D Array : " << endl;

cout << "\n";

for (int r = 0; r < row; r++)

{

cout << " ";

for (int c = 0; c < col; c++)

{

cout << setw(5) << myArray2[r][c];

}

cout << endl;

}

}

// Task 10

// 10. 6 x 6 ölçülü massivdə, qonşu sətirlərin yerini dəyişin.

void task10()

{

// Creating Headline

cout << "\n Task 10" << endl;

cout << "\n The program change the position of adjacent lines in a 2D array." << endl;

cout << "-----------------------------------------------------------------" << endl;

// Creating the length of rows and columns of the 2D array

const int row = 6;

const int col = 6;

// Creating 2D array

int myArray[row][col] = {};

// Determining the maximum and minimum of the random numbers

srand(time(0));

int min = 1;

int max = 20;

// Filling the 2D array with the random numbers

int random = 0;

for (int r = 0; r < row; r++)

{

for (int c = 0; c < col; c++)

{

random = min + rand() % (max - min);

myArray[r][c] = random;

}

}

// Printing the 2D array

cout << "\n My 2D Array : " << endl;

for (int r = 0; r < row; r++)

{

if (r == 0)

cout << " \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_" << endl;

else

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

cout << " ";

for (int c = 0; c < col; c++)

{

cout << "|" << setw(3) << myArray[r][c];

}

cout << "|" << endl;

}

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

// Changing the location of the position of adjacent lines in a 2D array

int myArray2[row][col] = {};

for (int r = 0; r < row; r+=2)

{

for (int c = 0; c < col; c++)

{

myArray2[r][c] = myArray[r+1][c];

myArray2[r+1][c] = myArray[r][c];

}

}

// Printing the Changed 2D array

cout << "\n";

cout << "\n My Changed 2D Array : " << endl;

for (int r = 0; r < row; r++)

{

if (r == 0)

cout << " \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_" << endl;

else

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

cout << " ";

for (int c = 0; c < col; c++)

{

cout << "|" << setw(3) << myArray2[r][c];

}

cout << "|" << endl;

}

cout << " |\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|\_\_\_|" << endl;

}

void line()

{

cout << "\n\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*" << endl;

}

void cn()

{

int space = 0;

cout << "\n TO GO ANOTHER TASK, PRESS 1 . . . ";

cin >> space;

if (space == 1)

system("cls");

}

void main()

{

line();

task1();

line();

cn();

line();

task2();

line();

cn();

line();

task3();

line();

cn();

line();

task4();

line();

cn();

line();

task5();

line();

cn();

line();

task6();

line();

cn();

line();

task7();

line();

cn();

line();

task8();

line();

cn();

line();

task9();

line();

cn();

line();

task10();

line();

}