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// Chuong trinh xay dung cac ham

#include <iostream>

using namespace std;

const int maxr = 100;

const int maxc = 100;

void NhapMang ( int a[][100], int m, int n );

void XuatMang ( int a[][100], int m, int n );

double TrungBinhCong ( int a[][100], int m, int n);

bool SearchX ( int a[][100], int m, int n, int x );

void KiemTraX ( int a[][100], int m, int n, int x );

void HoanDoi ( int a[][100], int m, int n, int &x, int &y );

int TichCot ( int a[][100], int m, int n, int cot);

int main ()

{

int a[maxr][maxc] = {0};

int m,n;

int x,y;

int gt, cot; // gt la gia tri can tim trong mang

do {cout <<" Nhap so dong ban can: "; cin >> m; cout << endl;

if ( m <= 0 || m > maxr)

cout <<" Nhap sai. Nhap lai\n";

} while ( m <= 0 || m > maxr);

do {cout <<" Nhap so cot ban can: "; cin >> n; cout << endl;

if ( n <= 0 || n > maxc)

cout <<" Nhap sai. Nhap lai\n";

} while ( n <= 0 || n > maxc);

// Nhap mang

NhapMang( a, m, n );

// Xuat mang

XuatMang ( a, m, n);

// Trung binh cong

cout <<" Trung binh cong cua mang la: " << TrungBinhCong( a, m, n )<< endl;

// Kiem Tra X ton tai hay khong

cout <<" Ban can tim gia tri nao: ";

cin >> gt;

KiemTraX ( a, m ,n , gt);

// Hoan doi

do {cout <<" Nhap vao gia tri x ban muon hoan doi: ";

cin >> x;

if ( SearchX ( a, m, n, x ) == false)

cout << x <<" khong ton tai trong mang. Xin Nhap lai\n";

} while (SearchX ( a, m, n, x ) == false);

do {cout <<" Nhap vao gia tri y ban muon hoan doi: ";

cin >> y;

if ( SearchX ( a, m, n, y ) == false)

cout << y <<" khong ton tai trong mang. Xin Nhap lai\n";

} while (SearchX ( a, m, n, y ) == false);

HoanDoi ( a, m, n, x, y );

// Xuat mang sau khi hoan doi

XuatMang(a, m, n );

// Tinh tich cot

do {cout <<" Nhap cot can tinh tich: ";

cin >> cot;

if ( cot <= 0 || cot > n )

cout <<"Nhap sai. Nhap lai\n";

}while( cot <= 0 || cot > n );

cout <<" Tich cot ban can tinh la: " << TichCot (a, m, n, cot) << endl;

system ("pause");

return 0;

}

// Ham nhap mang

void NhapMang ( int a[][100], int m, int n )

{

cout <<" Nhap vao cac gia tri cua mang: \n";

for ( int i = 0; i < m; i ++)

{

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

{

cout <<" Nhap phan tu thu a[ " << i <<" ][ "<< j <<" ]: ";

cin >> a[i][j];

}

cout << endl;

}

}

// ham Xuat mang

void XuatMang ( int a[][100], int m, int n )

{

cout <<" Cac gia tri mang luu tru la: \n";

for ( int i = 0; i < m; i ++)

{

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

{

cout << a[i][j] <<"\t";

}

cout << endl;

}

}

// Ham trung binh cong

double TrungBinhCong ( int a[][100], int m, int n)

{

double Tong = 0;

int T = m \* n;

for ( int i = 0; i < m; i ++)

{

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

{

Tong += a[i][j];

}

}

return Tong / T;

}

// Ham tim x co ton tai trong mang

bool SearchX ( int a[][100], int m, int n, int x )

{

for ( int i = 0; i < m; i ++)

{

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

{

if ( a[i][j] == x )

return true; // x ton tai trong mang

}

}

return false; // x khong ton tai trong mang

}

// Kiem tra x

void KiemTraX ( int a[][100], int m, int n, int x )

{

if ( SearchX(a, m, n, x ) == true )

cout << x << " co ton tai trong mang\n";

else

cout << x << " khong co ton tai trong mang\n";

}

// Hoan doi 2 gia tri

void HoanDoi ( int a[][100], int m, int n, int &x, int &y )

{

if (SearchX ( a, m, n, x )== true && SearchX ( a, m, n, y )== true)

{

for ( int i = 0; i < m; i ++)

{

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

{

if ( a[i][j] == x )

{

a[i][j] = y;

continue;

}

if (a[i][j] == y)

{

a[i][j] = x;

continue;

}

}

}

}

}

// Ham tinh tich cot i

int TichCot ( int a[][100], int m, int n, int cot)

{

int Tich = 1;

for ( int k = 0; k < m; k++) // k chay hang

Tich \*= a[k][cot - 1];

return Tich;

}