САА - Lab 1

Linear Algorithms

Problem 1

Calculating the area of ​​a triangle using Heron's formula



#include "stdafx.h"

#include <iostream>

#include "math.h"

using namespace std;

int \_tmain(int argc, \_TCHAR\* argv[])

{

float a, b, c, p, s;

cout << "a = ";

cin >> a;

cout << "b = ";

cin >> b;

cout << "c = ";

cin >> c;

p = (a + b + c)/2;

s = sqrt(p\*(p-a)\*(p-b)\*(p-c));

cout << "s = " << s << "\n";

return 0;

}

Problem 2\*

Design an algorithm and write a program that finds the sum of the digits of a natural three-digit number

Problem 3

Swapping the values ​​of two variables (natural numbers) by multiplication

#include "stdafx.h"

#include <iostream>

using namespace std;

int \_tmain(int argc, \_TCHAR\* argv[])

{

int a, b;

cout << "a = ";

cin >> a;

cout << "b = ";

cin >> b;

a = a\*b;

b = a/b;

a = a/b;

cout << "a = " << a << "\n";

cout << "b = " << b << "\n";

return 0;

}

Problem 4\*

Design an algorithm and write a program that swaps the values ​​of two variables (natural numbers) by addition

Problem 5\*

Write a program that finds the perimeter of a triangle using the law of sines, when two angles and a side are known



Conditional Algorithms

Problem 6

Finding the largest number among three numbers

#include "stdafx.h"

#include <iostream>

using namespace std;

int \_tmain(int argc, \_TCHAR\* argv[])

{

int a, b, c, max;

cout << "a = "; cin >> a;

cout << "b = "; cin >> b;

cout << "c = "; cin >> c;

if(a>b)

max = a;

else

max = b;

if(c>max)

max = c;

cout << "max = " << max << "\n";

return 0;

}

Problem 7\*

Write a program to determine if a given year is a leap year (Hint: The extra leap day occurs in each year that is a multiple of 4, except for years evenly divisible by 100 but not by 400.)

Loop algorithms

Problem 8

Finding the factorial - n! = 1.2.3 ... n, of a non-negative integer n

#include "stdafx.h"

#include <iostream>

using namespace std;

int \_tmain(int argc, \_TCHAR\* argv[])

{

int n, i;

float fact;

cin >> n;

fact = 1;

for(i=1; i<=n; i++)

fact = fact\*i;

cout << n << "! = " << fact << "\n";

return 0;

}

Problem 9\*

Rewrite the program in Problem 2 so that it finds the sum of the digits of a natural number with an arbitrary number of digits

Algorithms with 1D Arrays

Problem 10

Finding the largest element of a one-dimensional array, the average of the sum of the elements, the number of elements with odd values, and whether the number n is contained in the negative elements of the array

#include "stdafx.h"

#include <iostream>

#define N 5

using namespace std;

int \_tmain(int argc, \_TCHAR\* argv[])

{

int i, arr[N], max, k = 0, n, p = 0;

float sum = 0;

cin >> n;

for(i=0; i<N; i++)

{

cout << "arr[" << i << "] = ";

cin >> arr[i];

}

max = arr[0];

for(i=0; i<N; i++)

{

sum = sum + arr[i];

if(arr[i] > max)

max = arr[i];

if(arr[i]%2 != 0 && arr[i]!= 0)

k++;

if(arr[i] < 0)

if(n == arr[i])

p = 1;

}

cout << "max = " << max << "\n";

cout << "k = " << k << "\n";

cout << "avg = " << sum/N << "\n";

if(p)

cout << "YES\n";

else

cout << "NO\n";

return 0;

}

Problem 11\*

Design an algorithm and write a program that counts the number of pairs of adjacent elements in which the two elements have different signs

1. Run and analyze the solved problems – 1, 3, 6, 8 and 10.

2. Design algorithms and write programs that solve the remaining problems – 2\*, 4\*, 5\*, 7\*, 9\* and 11\*.