Ministry of Education and Science of Ukraine
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Faculty of Computer Engineering Intelligent and Control System

Department of Automated Systems Software

LABORATORY WORK № 3

in the discipline "Programming and algorithmic languages"

Lab Theme: Using Functions (Methods) in C#

Option 3

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1. Setting the task:

The coordinates of point A(0,0) are given, we need to find the coordinates of point C(x,y) so that the area of the triangle is minimal and at the same time canceled from zero. The program receives two values, a and b - the coordinates of point B on the Cartesian coordinate system, and calculates the minimum area of the triangle.

2. Source code:

```csharp
using System;

class Program
{
static double CalcTriangleSquare(int Bx, int By, int Cx, int Cy)
{
  return 0.5 * Math.Abs(Bx * (Cy - 0) + Cx * (0 - By));
}

static void CalcTriangleSquareByPoints(int a, int b)
{
  int MODULE_A = Math.Abs(a);
  int MODULE_B = Math.Abs(b);
  double tempSquare, solutionSquare = int.MaxValue;
  int Ax = 0, Ay = 0, Cx = 0, Cy = 0;

  for (int x = 0; x <= MODULE_A; x++)
  {
      for (int y = 0; y <= MODULE_B; y++)
      {
          tempSquare = CalcTriangleSquare(MODULE_A, MODULE_B, x, y);
          if (tempSquare != 0 && tempSquare < solutionSquare)
          {
              solutionSquare = tempSquare;
              Cx = x;
              Cy = y;
          }
      }
  }

  Console.WriteLine($"\nSmallest square of triangle equals: {solutionSquare}");
  Console.WriteLine($"Coordinates of point C equals: ({(a < 0 && Cx != 0 ? '-' : ' ')}{Cx}; {(b < 0 && Cy != 0 ? '-' : ' ')}{Cy})");
}

static void Main()
{
  Console.WriteLine("Task #3. Lab #3\n");
  Console.WriteLine("The coordinates of point A(0,0) are given, we need to find the coordinates of point C(x;y) so that the area of the triangle is minimal and at the same time canceled from zero.");
  Console.WriteLine("The program receives two values, a and b - the coordinates of point B on the Cartesian coordinate system, and calculates the minimum area of the triangle.\n");

  Console.Write("Enter here the value x of point B:");
  int a = int.Parse(Console.ReadLine());

  Console.Write("Enter here the value y of point B:");
  int b = int.Parse(Console.ReadLine());

  CalcTriangleSquareByPoints(a, b);
```
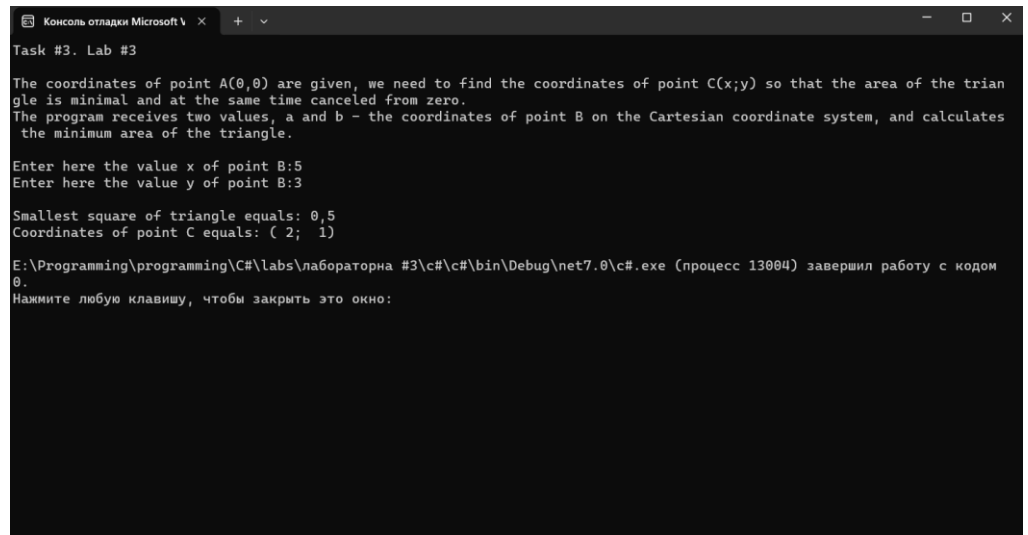
```
        }
    }
}
```

3. Links:
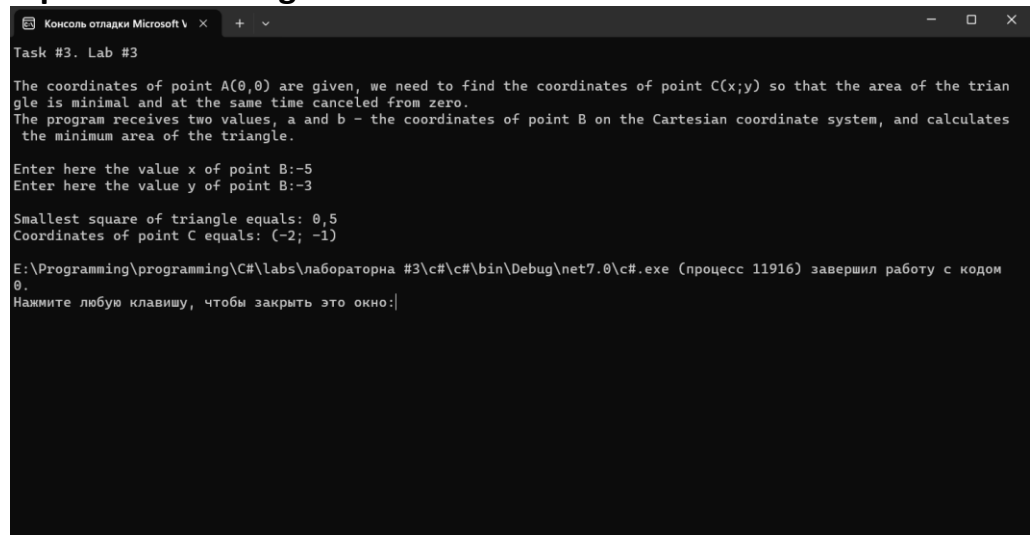
4. Input and output data results:

4.1 input with positive numbers (5,3):

Output: 0.5;

4.2 input with the negative numbers:

Output: 0.5;

5. Conclusion:

The conclusion to the laboratory work on programming on the topic "Using Functions (Methods) in C#" reflects the successful mastery of the concepts of creating and using functions in the C# programming language. got acquainted with the basic principles of declaring and defining functions, their parameters and return values. Also, the

possibilities of passing arguments by value and by reference, as well as the use of variables with scope were considered.