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USING THE C# PROGRAMMING LANGUAGE TO FIND OPTIMAL SOLUTIONS TO BOUNDARY-RELATED PROBLEMS

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Annotation. *In this article, we will cover the topic "Using C# Programming Languages to Solve Problems with Remarkable Limits" and analyze the conveniences that the C# programming language provides in solving scientific calculations and limit problems.*

Keywords: *C#, awesome limit, mathematical expression, strong types, safe types, net library, System.Math, nuclear systems, function, simulation.*

Аннотация. *В этой статье мы рассмотрим тему «Использование языков программирования C# для решения задач с замечательными пределами» и проанализируем удобства, которые предоставляет язык программирования C# при решении научных расчетов и задач с пределами.*

Ключевые слова: *C#, awesome limit, математическое выражение, строгие типы, безопасные типы, сетевая библиотека, System.Math, ядерные системы, функция, моделирование.*

Programming languages are now used not only to create databases and systems for the general public, but also for scientific calculations and solving complex mathematical problems. At the same time, problems with infinite limits, as an integral part of mathematics, require modeling in programming languages. The C# programming language, with its powerful core libraries, high-level syntax, and object-

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oriented approach, can be an effective tool for performing scientific calculations and simulations.

C# is an object-oriented programming language developed by Microsoft and runs on the .NET platform. It has a highly intuitive syntax, strong and safe types, and optimized performance for multi-core systems. The C# programming language is well-suited for mathematical computations and scientific problems. C#'s .NET library provides a number of features for developing mathematical functions and algorithms quickly and efficiently.

Limits are particularly important in mathematics, especially in the analysis of functions and their behavior. Limits can be used to understand, for example, when and under what conditions a function can reach infinity, become continuous, or approach infinity.

Limits are also important in evaluating values approaching infinity and in many areas of mathematical analysis, such as differential equations, integral calculus, set theory, and others.

There are several approaches to calculating limits in the C# programming language. C#, due to its features, provides efficient capabilities for calculating mathematical functions.

C# has a powerful library for mathematical computations. In particular, the System.Math library provides many basic mathematical functions (such as sine, cosine, logarithm, exponent, etc.). These can be used to calculate the value of a function at a user-specified point when calculating limits.

For example, let's consider the following issue.

The C# code for a function approaching an infinite limit can be written as follows:

```
using System;
class Program
{    static void Main()
   {       double x = 1e-6; // juda kichik qiymat
          double result = 1 / x; // limitni hisoblash
```

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```
        Console.WriteLine("Limit: " + result);
    }}
```

Here x is a very small value and is used to calculate the limit of the function 1/x.

C# allows you to perform mathematical simulations. In this case, calculations are performed using numerical approaches instead of analytical approaches for complex limit problems. For example, to determine the limit of a function, you can calculate its value at many small points and analyze the results.

For example, in the code below, we calculate the function for which we want to determine the limit:

```
using System;
class Program
{   static void Main()
    {       double h = 1e-5;
        double x = 3.0;
        double limit = (Math.Pow(x + h, 2) - Math.Pow(x, 2)) / h;
        Console.WriteLine("Limit: " + limit);
    }}
```

In this code, the limit of the function f(x) = x^2 can be calculated by minimizing h.

The C# programming language has many tools for dealing with limits and infinity. The double data type can be used for mathematical modeling and working with infinite values in C#.

There are some limitations and difficulties in calculating limits in the C# programming language. Among these are the important issues of working with infinite values, obtaining results with high accuracy, and optimizing the speed of calculations. The following approaches will help to solve the problems:

Increase precision – double data types can sometimes not give precise results. In this case, using decimal data types can lead to more precise results.

Infinity Handling – C# has double.PositiveInfinity and double.NegativeInfinity values, which make it convenient to work with infinite values.

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Function optimization – C# can be used to optimize algorithms, for example, analyzing and optimizing math functions to compute functions at high speed and improve accuracy.

The C# programming language is a powerful and efficient tool for solving mathematical calculations and limit problems, and can be used in scientific research, programming, and simulation. C#'s highly optimized core libraries, precision, and infinite-precision capabilities make mathematical modeling easy. At the same time, there are many approaches and techniques for solving limit problems in C#, making it an ideal tool for efficient calculations.

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