**ОТЧЕТ**

по лабораторной работе №2

Решение детерминированной задачи методом статистического моделирования

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***Цель работы:*** 1) изучение метода статистического моделирования

Монте-Карло решения детерминированной задачи;

2) реализация метода Монте-Карло решения детерминированной задачи.



**Код программы**

using System;

using System.Collections.Generic;

using System.Linq;

using System.Text;

using System.Threading.Tasks;

using System.Windows;

using System.Windows.Controls;

using System.Windows.Data;

using System.Windows.Documents;

using System.Windows.Input;

using System.Windows.Media;

using System.Windows.Media.Imaging;

using System.Windows.Navigation;

using System.Windows.Shapes;

using ZedGraph;

namespace IMS\_01

{

/// <summary>

/// Логика взаимодействия для Lab\_2.xaml

/// </summary>

public partial class Lab\_2 : Page

{

ZedGraphControl zedGraphControl1;

public class Data

{

public int I { get; }

public double X { get; }

public double Y { get; }

public Data(int i, double x, double y)

{

I = i;

X = x;

Y = y;

}

}

public Lab\_2()

{

InitializeComponent();

zedGraphControl1 = new ZedGraphControl();

}

private void calcButton\_Click(object sender, RoutedEventArgs e)

{

try

{

double a = Convert.ToDouble(tbA.Text);

double b = Convert.ToDouble(tbB.Text);

double k = Convert.ToDouble(tbK.Text);

double c = Convert.ToDouble(tbC.Text);

int n = Convert.ToInt32(tbN.Text);

int all = 0, successful = 0;

if (n < 1) throw new Exception("Количество меньше нуля");

Random rnd = new Random();

List<Data> data = new List<Data>();

double[] ax = new double[200];

double[] ay = new double[200];

double? fmax = null;

windowsFormsHost.Child = zedGraphControl1;

zedGraphControl1.Width = zedGraphControl1.Height = 400;

zedGraphControl1.GraphPane.CurveList.Clear();

for (int i = 0; i < 200; i++)

{

double x = (double)i / 200;

double z = (b - a) \* x + a;

ax[i] = (double)i / 20;

ay[i] = k / ax[i] + c;

double f = k / z + c;

if (fmax == null || fmax < f) fmax = f;

}

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

{

int integer = rnd.Next(0, 101);

double z = (double)integer / 100;

double x = (b - a) \* z + a;

integer = rnd.Next(0, 101);

z = (double)integer / 100;

double y = (double)fmax \* z;

data.Add(new Data(i + 1, x, y));

if (y <= k / x + c)

{

successful++;

zedGraphControl1.GraphPane.AddCurve("",

new double[1] { x }, new double[1] { y },

System.Drawing.Color.Magenta, SymbolType.Circle);

}

else

{

zedGraphControl1.GraphPane.AddCurve("",

new double[1] { x }, new double[1] { y },

System.Drawing.Color.LimeGreen, SymbolType.Circle);

}

all++;

}

textBlock.Text = "Вероятность: " + ((double)successful / all);

dataGrid.ItemsSource = data;

zedGraphControl1.GraphPane.AddCurve("",

ax, ay, System.Drawing.Color.Red, SymbolType.None);

zedGraphControl1.GraphPane.AddCurve("",

new double[2] { a, a }, new double[2] { 0, (double)fmax },

System.Drawing.Color.Blue, SymbolType.None);

zedGraphControl1.GraphPane.AddCurve("",

new double[2] { b, b }, new double[2] { 0, (double)fmax },

System.Drawing.Color.Blue, SymbolType.None);

zedGraphControl1.GraphPane.AddCurve("",

new double[2] { a, b }, new double[2] { (double)fmax, (double)fmax },

System.Drawing.Color.Blue, SymbolType.None);

zedGraphControl1.AxisChange();

zedGraphControl1.Invalidate();

}

catch (Exception ex)

{

MessageBox.Show("Возникла ошибка:\n" + ex.Message);

}

}

}

}

Блок-схема программы

Ввод данных

-

+

fmax = f

fmax == null || fmax < f

double x = (double)i / 200;

double z = (b - a) \* x + a;

ax[i] = (double)i / 20;

ay[i] = k / ax[i] + c;

double f = k / z + c;

for (int i = 0; i < 200; i++)

int all = 0, successful = 0;

Random rnd = new Random();

List<Data> data = new List<Data>();

double[] ax = new double[200];

double[] ay = new double[200];

double? fmax = null;

Вывод данных и графика

all++;

y <= k / x + c

zedGraphControl1.GraphPane.AddCurve("",

new double[1] { x }, new double[1] { y },

System.Drawing.Color.LimeGreen, SymbolType.Circle);

successful++;

zedGraphControl1.GraphPane.AddCurve("",

new double[1] { x }, new double[1] { y },

System.Drawing.Color.Magenta, SymbolType.Circle);

int integer = rnd.Next(0, 101);

double z = (double)integer / 100;

double x = (b - a) \* z + a;

integer = rnd.Next(0, 101);

z = (double)integer / 100;

double y = (double)fmax \* z;

data.Add(new Data(i + 1, x, y));

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

Результат программы











