***Form1.cs***

﻿using System;

using System.Collections.Generic;

using System.ComponentModel;

using System.Data;

using System.Drawing;

using System.Linq;

using System.Text;

using System.Windows.Forms;

namespace MeanFieldTheory

{

public partial class Form1 : Form

{

double J , Z, KB, T;

public Form1()

{

J = 1; Z = 4; KB = 1; T = 5;

InitializeComponent();

}

private void button1\_Click(object sender, EventArgs e)

{

this.Refresh();

Graphics gg = CreateGraphics();

SolidBrush bred = new SolidBrush(Color.Red);

SolidBrush bblue = new SolidBrush(Color.Blue);

Pen pblue = new Pen(Color.Blue, 5);

Font f = new Font("Arial", 16);

gg.DrawLine(pblue, 300, 400, 600, 400);

gg.DrawString("<s>", f, bred, 550, 420);

gg.DrawLine(pblue, 450, 200, 450, 600);

gg.DrawString("g(<s>)/f(<s>))", f, bred, 400, 180);

string solutions="";

for (double s = -1.5; s <= 1.5; s = s + 0.001)

{

gg.FillEllipse(bblue, 450 + (float)s \* 80, 400 - (float)gfun(s) \* 80, 4, 4);

//g(<s>=s)

gg.FillEllipse(bred, 450 + (float)s \* 80, 400 -

(float)ffun(s) \* 80, 4, 4);

if (Math.Abs(gfun(s) - ffun(s)) < 0.0005)

{

// s = Math.Round(s, 3, MidpointRounding.ToEven);

solutions =solutions+s.ToString()+", ";

}

}

gg.DrawString("The <s> values= "+solutions, f, bred, 550, 100);

//MessageBox.Show("The possible solution values of <s> are " + solutions);

}//end of event handler

double gfun(double s)

{

return s;

}

double ffun(double s)

{

return Math.Tanh(J \* Z \* s / (KB \* T));

}

private void button2\_Click(object sender, EventArgs e)

{

this.Refresh();

Graphics gg = CreateGraphics();

SolidBrush bred = new SolidBrush(Color.Red);

SolidBrush bblue = new SolidBrush(Color.Blue);

Pen pblue = new Pen(Color.Blue, 5);

Font f = new Font("Arial", 16);

gg.DrawLine(pblue, 610, 400, 1010, 400);

gg.DrawString("<s>", f, bred, 1000, 420);

gg.DrawLine(pblue, 810, 200, 810, 600);

gg.DrawString("f(<s>))", f, bred, 750, 180);

string solutions = "";

for (double s = -1.5; s <= 1.5; s = s + 0.001)

{

gg.FillEllipse(bred, 810 + (float)s \* 80, 400 -

(float)(s-ffun(s)) \* 80, 4, 4);

if (Math.Abs(s - ffun(s)) < 0.0005)

{

// s = Math.Round(s, 3, MidpointRounding.ToEven);

solutions = solutions + s.ToString() + ", ";

}

}

gg.DrawString("The <s> values= " + solutions, f, bred, 550, 100);

}

private void button3\_Click(object sender, EventArgs e)

{

this.Refresh();

Graphics gg = CreateGraphics();

SolidBrush bred = new SolidBrush(Color.Red);

SolidBrush bblue = new SolidBrush(Color.Blue);

Pen pblue = new Pen(Color.Blue, 5);

Font f = new Font("Arial", 16);

gg.DrawLine(pblue, 300, 400, 600, 400);

gg.DrawString("T", f, bred, 550, 420);

gg.DrawLine(pblue, 450, 200, 450, 600);

gg.DrawString("<M>/<s>", f, bred, 400, 180);

double Tc=0;

for (T=0.1;T<6;T=T+0.001)

{

for (double s = -1.5; s <= 1.5; s = s + 0.001)

{

if(Math.Abs(s-Math.Tanh(J\*Z\*s/(KB\*T)))<0.00001)

{

if(s<0)

gg.FillEllipse(bred, 450 + (float)T \* 80,

400 - (float)s \* 80, 4, 4);

if (s > 0)

gg.FillEllipse(bblue, 450 + (float)T \* 80,

400 - (float)s \* 80, 4, 4);

if (Math.Abs(s) >= 0.001) Tc = T;

}

}

}

MessageBox.Show("Tc=" + Tc.ToString());

}//end of event handler

}

}

***Program.cs***

﻿using System;

using System.Collections.Generic;

using System.Linq;

using System.Windows.Forms;

namespace MeanFieldTheory

{

static class Program

{

/// <summary>

/// The main entry point for the application.

/// </summary>

[STAThread]

static void Main()

{

Application.EnableVisualStyles();

Application.SetCompatibleTextRenderingDefault(false);

Application.Run(new Form1());

}

}

}