

```
1 using System;
2 using System.Diagnostics;
3 using System.Drawing;
4 using System.Windows.Forms;
5
6 namespace MonteCarloPi
7 {
8     public partial class MainForm : Form
9     {
10         private int number = 0;
11         private int hits = 0;
12         private Random random = new Random();
13         private Stopwatch sw;
14
15         public MainForm()
16         {
17             InitializeComponent();
18             panel1.Paint += Panel1_Paint;
19         }
20
21         private void button1_Click(object sender, EventArgs e)
22         {
23             try
24             {
25                 sw = new Stopwatch();
26                 sw.Start();
27                 number = (int)numericUpDown1.Value;
28                 progressBar1.Value = 0;
29                 panel1.Invalidate();
30             }
31
32             catch (Exception ex)
33             {
34                 MessageBox.Show(ex.ToString(), "Warning",
35                     MessageBoxButtons.OK, MessageBoxIcon.Warning);
36             }
37         }
38
39         private void Panel1_Paint(object sender, PaintEventArgs e)
40         {
41             int x0 = panel1.ClientRectangle.Left;
42             int y0 = panel1.ClientRectangle.Top;
43             int x1 = panel1.ClientRectangle.Right;
44             int y1 = panel1.ClientRectangle.Bottom;
45             int dx = x1 - x0 - 3;
46             int dy = y1 - y0 - 3;
47             double xSlope = dx;
48             double xInter = x0 + 2;
49             double ySlope = -dy;
50             double yInter = y0 + 2 + dy;
51             Graphics g = e.Graphics;
52             Pen blackPen = new Pen(Color.Black);
```

```
53     Pen bluePen = new Pen(Color.Blue);
54     Pen redPen = new Pen(Color.Red);
55
56     // draw a black square
57
58     g.DrawRectangle(blackPen, x0 + 2, y0 + 2, x1 - x0 - 3, y1 - y0 - 3);
59     g.DrawEllipse(blackPen, x0 + 2, y0 + 2, x1 - x0 - 3, y1 - y0 - 3);
60     hits = 0;
61
62     for (int i = 0; i < number; i++)
63     {
64         double x = random.NextDouble();
65         double y = random.NextDouble();
66         int xp = (int)(xSlope * x + xInter);
67         int yp = (int)(ySlope * y + yInter);
68
69         if ((x - 0.5) * (x - 0.5) + (y - 0.5) * (y - 0.5) <= 0.25)
70         {
71             g.DrawEllipse(bluePen, xp, yp, 1, 1);
72             hits++;
73         }
74         else
75         {
76             g.DrawEllipse(redPen, xp, yp, 1, 1);
77         }
78
79         progressBar1.Value = (int)((100.0 * i) / number);
80     }
81
82     if (number > 0)
83     {
84         double pi = (4.0 * hits) / number;
85         string s = string.Empty;
86         string t = string.Empty;
87
88         sw.Stop();
89         progressBar1.Value = 100;
90         t += sw.Elapsed.Hours.ToString("D2") + ":";
91         t += sw.Elapsed.Minutes.ToString("D2") + ":";
92         t += sw.Elapsed.Seconds.ToString("D2") + ".";
93         t += sw.Elapsed.Milliseconds.ToString("D3");
94         s += "Pi = " + pi.ToString("F5") + "\r\n";
95         s += "Runtime (hrs:min:sec:MS) = " + t + "\r\n";
96         MessageBox.Show(s, "Information",
97             MessageBoxButtons.OK, MessageBoxIcon.Information);
98     }
99 }
100 }
101 }
```