Klasa Graphics

Za crtanje u C# aplikacijama možemo da koristimo površinu neke sistemske kontrole. To postižemo korišćenjem metoda ugrađene klase Graphics. Objekat klase Graphics predstavlja površinu po kojoj crtamo. Prvo ga moramo kreirati, a zatim koristiti.

Pozivanjem metode **CreateGraphics()** za neku kontrolu, kreira se objekat klase Graphics tako da je površina za crtanje upravo ta kontrola.

Klasa Graphics sadrži metode za crtanje raznih oblika, između ostalog:

• DrawLine – za crtanje linija;

• DrawEllipse – za crtanje elipse;

• DrawRectangle – za crtanje pravougaonika;

• DrawArc – za crtanje proizvoljnog luka;

• DrawBezier – za crtanje krive linije oko četiri tačke;

• FillEllipse – za crtanje popunjene elipse;

• FillRectangle – za crtanje popunjenog pravougaonika.

Prostor za crtanje brišemo korišćenjem metoda **Clear** klase **Graphics.**
npr: **g.Clear(Color.White);** // briše i popunjava kontrolu belom bojom

Pri kreiranju metoda za crtanje, neophodno je kreirati olovku (objekat klase Pen) ili četku (objekat klase SolidBrush).

Klasa Pen je definisana u imenskom prostoru System.Drawing

Objektom klase Pen definišemo boju, širinu i stil linija i krivih koje crtamo. Svojstva:
• **Color** – struktura tipa Color;
• **Width** – širina linije tipa float;
•**DashStyle** – može biti Dash---, DashDot-.-., DashDotDot, Dot, Solid-puna linija (u imenskom prostoru System.Drawing.Drawing2D);

Kreiranje objekta klase Pen postižemo pozivom konstruktora. Najčešće se poziva konstruktor kojem predajemo kao parameter redom boju(Color) i širinu (float). Bez obzira koji konstruktor pozivamo njegov prvi parameter je boja. Kreira se objekat olovka klase Pen crvene boje I širine 5

npr: Pen olovka=new Pen(Color.Red,5);

(Postoji I klasa **Pens** za olovku širine 1 i sve standardne boje, npr. **Pens.Red** se poziva crvena)

Klasa SolidBrush

Pri crtanju popunjenih oblik (pravougaonik, elipsa) koristimo objekte klase SolidBrush. Definisana je svojstvom:

- **Color**

Kreiranje objekta cetka klase SolidBrush definiše se na sledeći način:

SolidBrush cetka= new SolidBrush(Color.Red);

Slično klasi Pens postoji klasa Brushes koja sadrži statička svojstva za dobijanje četki za svaku standardnu boju.

Kreirani objekti klase Graphics, Pen i Brush zauzimaju odgovarajuće rasurse našeg sistem pa je potrebno, po završetku crtanja, osloboditi resurse korišćenjem metode **Dispose()** klase **Graphics**. Npr. **Olovka.Dispose();**

Možemo koristiti **događaj Paint** za kontrolu, a on se pokreće odmah po učitavanju kontrole, ali i svaki put kada se kontrola iscrtava (postaje ponovo vidljiva ili osveži prikaz). Možemo je pozvati i eksplicitno u bilo kom delu aplikacije, pozivom metode **Refresh().**

Kada kreiramo dogadjaj **Paint** možemo koristiti objekat klase **Graphics** koji je deo prosledjenog parametra **e** , **tipa PaintsEventsArgs(e.Graphics)**, tog dogadjaja. Kada koristimo taj objekat ne pozivamo metod Dispose(), jer mi nismo kreirali objekat.

Svaka površina po kojoj se crta ima sopstveni koordinatni system čiji je početak tačka (0,0) u gornjem levom uglu te površine . Vrednosti X koordinata rastu sleva udesno, a Y odgore nadole.

Za predstavljanje jedne tačke koristimo strukturu **Point**, koja predstavlja tačku u ravni sacelobrojnim koordinatama (tip int)i definiše jedan piksel. Za kreiranje jedne tačke koristimo konstruktor **Point(x,y)**

Crtanje linije metodom DrawLine:

- **DrawLine(Pen olovka,Point A, Point B)**; -crtanje linije koja povezuje tačke A i B
- ili **DrawLine(Pen olovka,intx1,int y1,int x2, int y2);** -crtanje linije koja povezuje tačke(x1,y1) i (x2,y2)

Klasa Color

Boja je određena strukturom Color. Ova struktura sadrži static atribute (nepromenljive tj. iste za sve podklase) kojima su predstavljene najčešće korišćene boje (Red, Green, Blue, Yellow, Black, White...) ali i metod kojim možemo da definišemo boju:

FromArgb(nivoCrvene, nivoZelene, nivoPlave)

Vrednosti nivoCrvene, nivoZelene i nivoPlave su celi brojevi od **0 do 255**.

Klasa Random

Klasu Random koristimo za generisanje slučajnih brojeva. Prvo kreiramo objekat te klase pozivom konstruktora klase:

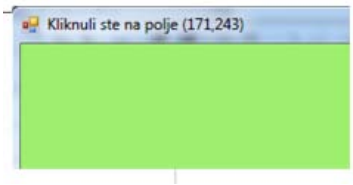
Random R = new Random();

Metod kojim generišemo slučajne brojeve je Next i on ima tri varijante:

- **Next()** vraća nenegativan slučajan 32-bitni ceo broj;
- **Next(maxVrednost)** vraća nenegativan slučajan 32-bitni ceo broj manji od maxVrednost;
- **Next(minVrednost, maxVrednost)** vraća nenegativan slučajan 32-bitni ceo broj veći ili jednak minVrednost i manji od maxVrednost;

1.zad Napraviti aplikaciju kojom se klikom na formu prouzrokuje slučajna promena boje pozadine forme, i u naslovnoj liniji ispisuje informacija o koordinatama tačke na koju smo kliknuli.

```
private void Form1_Load(object sender, EventArgs e)
 {
 Text = "Klikni na formu";
 Width = 500;
 Height = 500;
 }
private void Form1_MouseClick(object sender, MouseEventArgs e)
 {
    Random R = new Random();
    BackColor = Color.FromArgb(R.Next(256),R.Next(256),R.Next(256));
    Text = "Kliknuli ste na polje ("+e.X+","+e.Y+")";
 }
```



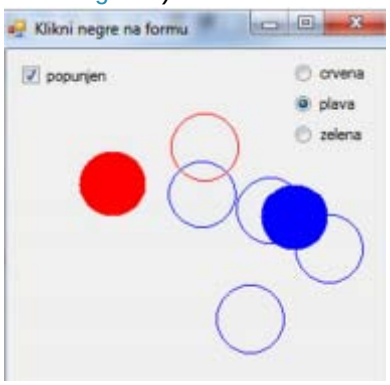
2.zad Kreirati aplikaciju kojom se crtaju linije kojima je koordinatna početne tačke određena položajaem strelice miša u trenutku pritiska dugmeta miša, a koordinata krajnje tačke određena položajem strelice miša u trenutku otpuštanja dugmeta.

```
public partial class Form1 : Form
 {
 public Form1()
 {
 InitializeComponent();
 }
 int xt, yt;
 private void Form1_MouseDown(object sender, MouseEventArgs e)
 {
   xt = e.X;
   yt = e.Y;
 }
 private void Form1_MouseUp(object sender, MouseEventArgs e)
 {
    Graphics g = CreateGraphics();
    Pen olovka=new Pen(Color.Black);
   g.DrawLine(olovka, xt, yt, e.X, e.Y);
   g.Dispose();
   olovka.Dispose();
 }
 }
```

Domaći: u aplikaciji iz zadatka iscrtavanje uraditi tako da svaka sledeća linija ima slučajno izabranu boju

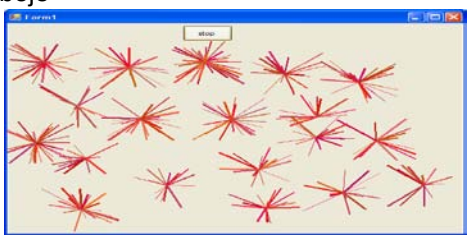
3.zad Kreirati aplikaciju za crtanje elipse (konture ili popunjene) i to u boji po izboru.

```
public partial class Form1 : Form
public Form1()
        {
            InitializeComponent();
        }
        Pen p = new Pen(Color.Red);
        SolidBrush b = new SolidBrush(Color.Red);

        private void Form1_MouseClick(object sender, MouseEventArgs e)

            {
            Graphics g = CreateGraphics();
            if (radioButton1.Checked)
            {
                p.Color = Color.Red;
                b.Color = Color.Red;
            }
            if (radioButton2.Checked)
            {
                p.Color = Color.Green;
                b.Color = Color.Green;
            }
            if (radioButton3.Checked)
            {
                p.Color = Color.Blue;
                b.Color = Color.Blue;
            }
            if (checkBox1.Checked)
                g.FillEllipse(b, e.X, e.Y, 50, 50);
            else
                g.DrawEllipse(p, e.X, e.Y, 50, 50);
        }
    }
}
```

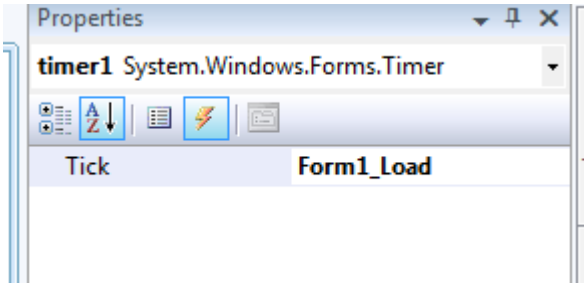


4.Kreirati aplikaciju kojom se pokreće iscrtavanje prskalice na poziciji odredjenoj položajem strelice miša u trenutku pritiska na taster miša. Svaka prskalica treba da bude u nijansama crvene boje

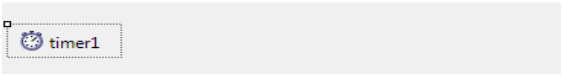
```
    public partial class Form1 : Form
    {
        public Form1()
        {
            InitializeComponent();
        }

        Point p;
        Random r = new Random();

        private void Form1_MouseClick(object sender, MouseEventArgs e)
        {
            p = new Point(e.X, e.Y);
            timer1.Start();
            timer1.Interval = 30;
        }
        private void timer1_Tick(object sender, EventArgs e)
        {
            Point b = new Point(r.Next(p.X - 50, p.X + 50), r.Next(p.Y - 50, p.Y + 50));
            Graphics g = CreateGraphics();
            Color boja = Color.FromArgb(r.Next(180, 256), r.Next(120), r.Next(120));
            Pen olovka =new Pen(boja, r.Next(1,4));
            g.DrawLine(olovka,p,b);
        }

        private void button1_Click(object sender, EventArgs e)
        {
            timer1.Stop();
        } }}
```



5. Kreirati aplikaciju kojom se prikazuje trenutni datum i vreme .
Posto velicina forme sa 4 labele treba da bude fiksna na formi u properties svojstvo FormBorderStyle na FixedDialog, a MaximizeBox i MinimazeBox na false.



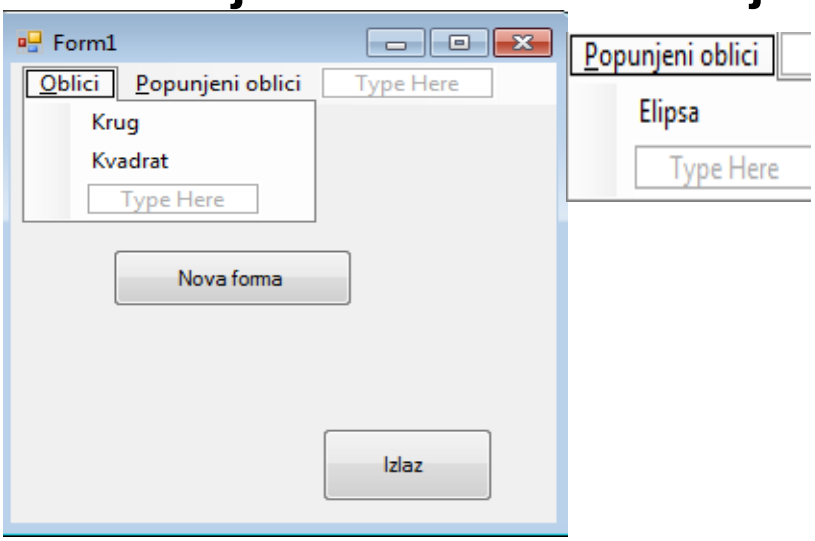
6.




```
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 _6
{
    public partial class Form1 : Form
    {
        public Form1()
        {
            InitializeComponent();
        }

        private void Form1_Load(object sender, EventArgs e)
        {
            label3.Text = DateTime.Now.ToLongDateString();
            label4.Text = DateTime.Now.ToLongTimeString();
        }
 }
}
```

Da bi se vreme ispravno prikazivalo potrebno je svake sekunde promeniti prikaz. Za to je potrbno postaviti objekat klase Timer (timer 1) iz ToolBox-a na formu i postaviti njego svojstvo Enable vrednosti na True i interval na 1000, to je 1 sekunda. Zatim u Tick dogadjaj tajmera ubaciti Form1Load (kao na slici).
.

6.Kreiranje novih formi i menija



Kreirati aplikaciju Forme meni.
Izgled forme - 2 dugmeta i meni koji se dobija uz pomoc opcije MenuStrip iz Toolbox-a. Oblici uneti kao &Oblici da bi kasnije moglo da se startuje sa tastature ALT+O, a meni &Popunjeni oblici (ALT+P) staviti podmeni Elipsa.
Dugmetu Izlaz dodeliti funkcionalnost 2xL klik i kucati:

```
private void button1_Click(object sender, EventArgs e)
        {
            Application.Exit();
        }
```

Napraviti novu formu.U SolutionExplorer-u u korenu stabla 1xD na C# Forme meni/Add-WidowsForm i nazvati je NovaForma (bez razmaka u naslovu).Dodati dugme *Zatvori formu* zute boje. Za razliku od naredbe **Application.Exit();** **naredba this.Close();** vrsi zatvaranje samo prozora forme NovaForma. 2xL na Dugme *zatvori formu*

```
private void button1_Click(object sender, EventArgs e)
        {
            this.Close();
        }
```

1xD na NovuFormu/ Properties/ BackGroundImage i ubacitesliku za pozadinu forme, a opciju BackGroundImageLayer stavite Strech.
Sada treba povezati NovuFormu sa osnovnom formom Form1. **2xL na dugme NovaForma na Formi1:**

```
 private void button2_Click(object sender, EventArgs e)
        {
            NovaForma frmNovaForma = new NovaForma();
            frmNovaForma.ShowDialog();
                                            }
```

Startujte aplikaciju.
Napraviti jos 3 nove forme i nazvati ih Krug,Kvadrat i Elipsa (SolutionExplorer-u u korenu stabla 1xD na C# Forme meni/Add-WidowsForm). Ove nove forme vezace se za glavnu formu preko menija.

2xL na opciju Krug menija i otkucati:

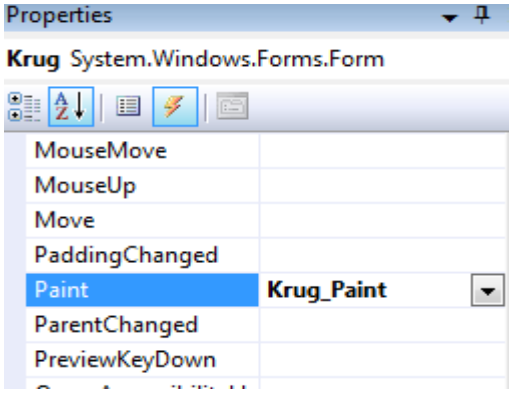
```
        private void krugToolStripMenuItem_Click(object sender, EventArgs e)
        {
            Krug odf = new Krug();
            odf.ShowDialog();
        }
```

2xL na opciju Kvadrat menija i otkucati:

```
private void kvadratToolStripMenuItem_Click(object sender, EventArgs e)
        {
            Kvadrat odf = new Kvadrat();
            odf.ShowDialog();
        }
```

2xL na opciju Elipsa menija i otkucati:

```
private void elipsaToolStripMenuItem_Click(object sender, EventArgs e)
        {
            Elipsa odf = new Elipsa();
            odf.ShowDialog();
        }
```



Sada cete izvrsiti crtanje kruga na formi Krug, 1xD properties na formu Krug i u dogadjajima Events izabrati dogadjaj Paint. 2xL na Paint i otkucati:

```
private void Krug_Paint(object sender, PaintEventArgs e)
        {
            Graphics g = CreateGraphics();
            Pen olovka = new Pen(Color.Blue,10);
            g.DrawEllipse(olovka, 50, 50, 100, 100);
            olovka.Dispose();
            g.Dispose();
        }
```

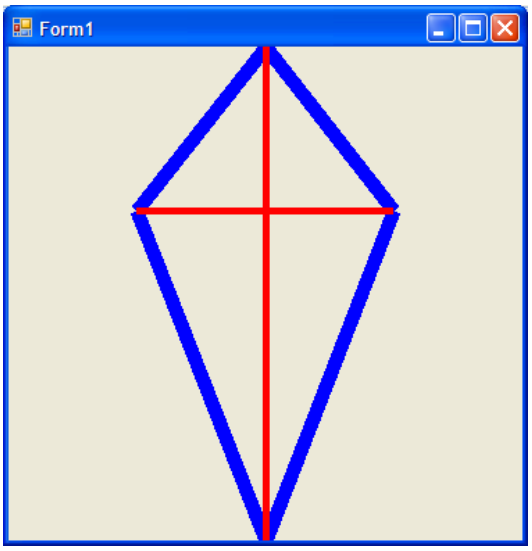
Dogadjaj Paint treba staviti i na formu Kvadrat i otkucati:

```
private void Kvadrat_Paint(object sender, PaintEventArgs e)
        {
            Graphics g = CreateGraphics();
            Pen olovka = new Pen(Color.Blue, 10);
            g.DrawRectangle(olovka, 50, 50, 100, 100);
            olovka.Dispose();
            g.Dispose();
        }
```

Dogadjaj Paint treba staviti i na formu Elipsa i otkucati:

```
private void Elipsa_Paint(object sender, PaintEventArgs e)
        {
            Graphics g = CreateGraphics();
            SolidBrush cetka = new SolidBrush(Color.Red);
            g.FillEllipse(cetka, 50, 50, 100, 150);
            cetka.Dispose();
            g.Dispose();
        }
```

7.Windows kontrole: PictureBox




```
namespace _10
{
    public partial class Form1 : Form
    {
        public Form1()
        {
            InitializeComponent();
        }

        private    void    Form1_Paint(object    sender,
PaintEventArgs e)
        {
            Graphics g = e.Graphics;
            Pen olovka=new Pen(Color.Blue,10);
            //Sirina prostora za crtanje
            int x=ClientRectangle.Width;
            //Visina prostora za crtanje
            int y=ClientRectangle.Height;
            Point A,B,C,D;
            //Odredjivanje temena cetvorougla
            A=new Point(x/4,y/3);
            B=new Point(x/2,y);
            C=new Point(3*x/4,y/3);
            D=new Point(x/2,0);

            //Crtanje stranica metodom DrawLine
            g.DrawLine(olovka, A, B);
            g.DrawLine(olovka, B, C);
            g.DrawLine(olovka, C, D);
            g.DrawLine(olovka, D, A);
            //Promena boje i širine olovke za dijagonale
            olovka.Color = Color.Red;
            olovka.Width = 5;
            //crtanje dijagonala
            g.DrawLine(olovka, A, C);
            g.DrawLine(olovka, B, D);
            olovka.Dispose();


        }

        private void Form1_Resize(object sender, EventArgs e)
        {
            Refresh();
        }
    }
}
```

8.Primer 8a crtanje u kontroli PictureBox


```
using System;...
namespace primer8a
{public class Form1 : System.Windows.Forms.Form
{
private System.Windows.Forms.Button btdijagonale;
private System.Windows.Forms.Button btpravougaonici;
private System.Windows.Forms.Button btelipsa;
private System.Windows.Forms.PictureBox pictureBox1;
private System.ComponentModel.Container components = null;
public Form1()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new Form1()); }
private void btdijagonale_Click(object sender, System.EventArgs e)
{
pictureBox1.Refresh();
Graphics g=pictureBox1.CreateGraphics();
Pen olovka=new Pen(Color.Red,3);
g.DrawLine(olovka,0,0,pictureBox1.Width,pictureBox1.Height);
g.DrawLine(olovka,pictureBox1.Width,0,0,pictureBox1.Height);
olovka.Dispose();
g.Dispose();
}
private void btpravougaonici_Click(object sender, System.EventArgs e)
{
Graphics g=pictureBox1.CreateGraphics();
g.Clear(Color.White);
Pen olovka=new Pen(Color.Red,3);
g.DrawRectangle(olovka,10,10,pictureBox1.Width-20 , pictureBox1.Height-20);
olovka.Dispose();
g.Dispose();
}
private void btelipsa_Click(object sender, System.EventArgs e)
{
pictureBox1.Refresh();
Graphics g=pictureBox1.CreateGraphics();
Pen olovka=new Pen(Color.Red,3);
g.DrawEllipse(olovka,10,10,pictureBox1.Width-20 , pictureBox1.Height-20);
olovka.Dispose();
g.Dispose();
}
}

 }
```

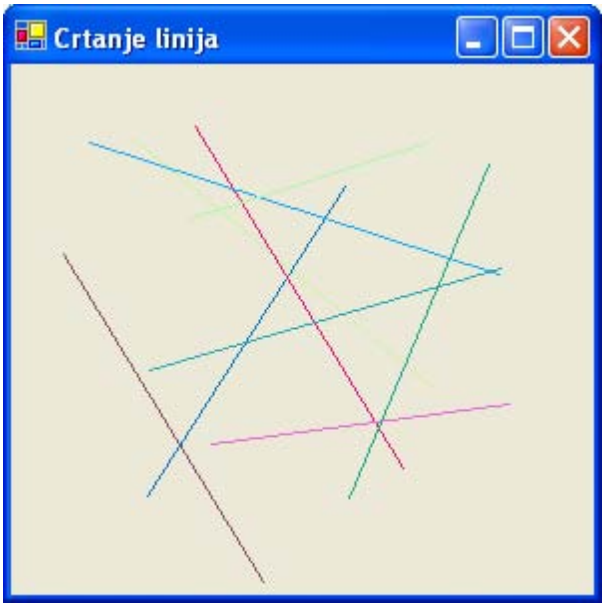
Primer 8b crtanje u klijentskoj oblasti uz generator slučajnih brojeva


```
using System;
using System.Drawing;
using System.Collections;
using System.ComponentModel;
using System.Windows.Forms;
using System.Data;
namespace primer8b
{public class Linije :
System.Windows.Forms.Form
{ private System.Windows.Forms.Timer timer1;
private System.ComponentModel.IContainer components;
Random R=new Random(); //generator slucajnih brojeva
int xp=0,yp=0; //koordinate pocetne tacke
public Linije()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new Linije()); }
private void timer1_Tick(object sender, System.EventArgs e)
{
Graphics g=CreateGraphics();
int x = R.Next(ClientRectangle.Width),
y = R.Next(ClientRectangle.Height); //izbor slucajnih koordinata
//kreiranje objekta olovka sa slucajnim karakteristikama
Pen olovka= new Pen(Color.FromArgb(R.Next(255),
R.Next(255), R.Next(255)));
//FromArgb daje komponentu boje red, green, blue
g.DrawLine(olovka, xp,yp,x,y); //linija od pocetne tacke to nove
xp = x; yp = y; //sledeci put, ovo ce biti pocetna tacka
olovka.Dispose();
g.Dispose();
}
}
}
```

Primer 8c crtanje u klijentskoj oblasti uz generator slučajnih brojeva

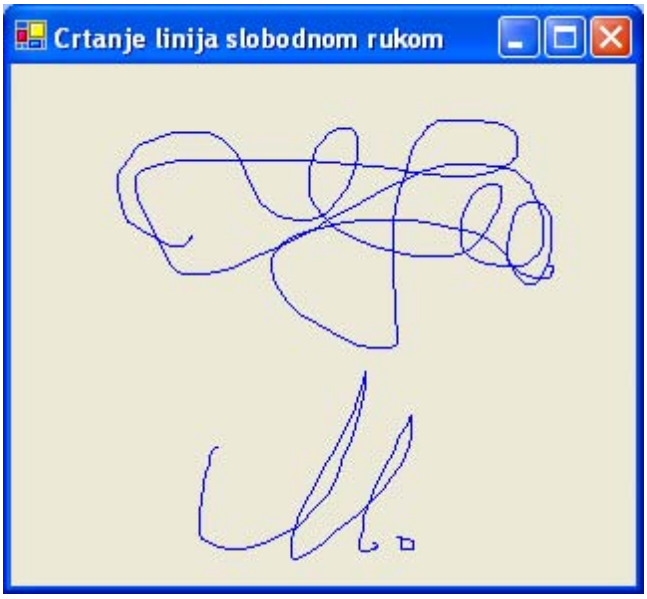

```
using System;
using System.Drawing;
using System.Collections;
using System.ComponentModel;
using System.Windows.Forms;
using System.Data;
namespace primer8c
{
public class Form1 : System.Windows.Forms.Form
{
private System.Windows.Forms.Timer timer1;
private System.ComponentModel.IContainer components;
Random R=new Random();
int br=0; //brojac iscrtanih krugova
public Form1()
{ InitializeComponent(); }
static void Main()
{
Application.Run(new Form1());
}
private void timer1_Tick(object sender, System.EventArgs e)
{
Graphics g=CreateGraphics();
int r=R.Next(20,100); //izbor precnika kruga
int x=R.Next(0,ClientRectangle.Width-r); //izbor koordinata temena kruga
int y=R.Next(0,ClientRectangle.Height-r);
//izbor slucajne cetke
SolidBrush cetka=new SolidBrush
(Color.FromArgb(R.Next(256),R.Next(256),R.Next(256)));
g.FillEllipse(cetka,x,y,r,r);
br++;
Text=br.ToString();
cetka.Dispose();
g.Dispose();
}
}
}
```

Primer 8d crtanje linija u klijentskoj oblasti uz događaj MouseUp, MouseDown




```
using System;
using System.Drawing;
using System.Collections;
using System.ComponentModel;
using System.Windows.Forms;
using System.Data;
namespace primer8d
{public class Mish :System.Windows.Forms.Form
{ int xp,yp; //koordinate pocetne tacke linije
private System.ComponentModel.Container components = null;
public Mish()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new Mish()); }
private void Mish_MouseUp(object sender, System.Windows.Forms.MouseEventArgs e)
{
Graphics g=CreateGraphics();
Random R = new Random();
Pen olovka=new Pen(Color.FromArgb(R.Next(256), R.Next(256), R.Next(256)));
g.DrawLine(olovka, xp,yp, e.X, e.Y); //e.X,e.Y koordinate misa
g.Dispose();
olovka.Dispose();
}
private void Mish_MouseDown(object sender, System.Windows.Forms.MouseEventArgs e)
{ //postavljanje koordinata pocetne tacke
xp=e.X;
yp=e.Y;
}
}
}
```

Primer 8e crtanje linija slobodnom rukom uz događaj MouseUp, MouseDown, MouseMove



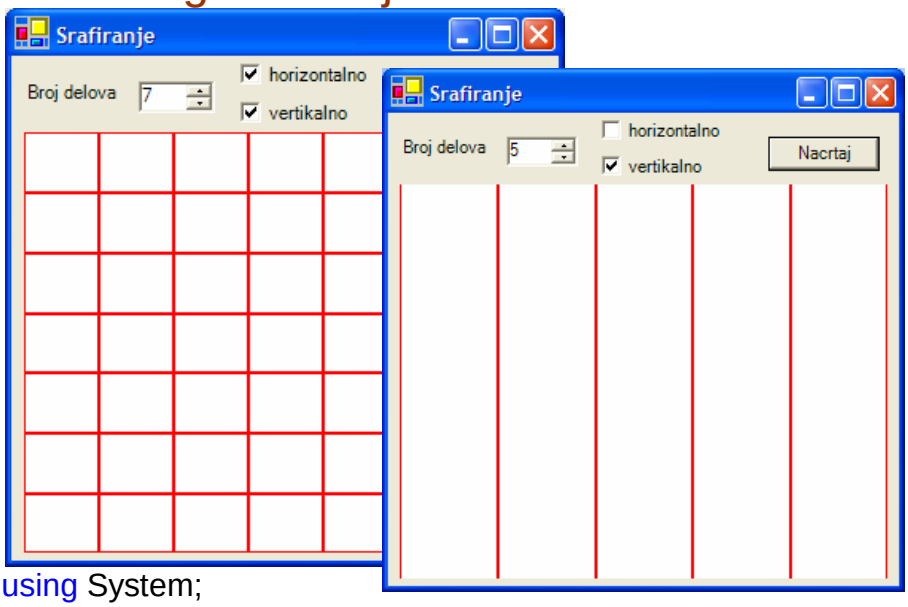

```
using System;
using System.Drawing;
using System.Collections;
using System.ComponentModel;
using System.Windows.Forms;
using System.Data;
namespace primer8e
{ public class SlobodnoCrtanje : System.Windows.Forms.Form
{
bool crtaj=false;
int xp,yp;
private System.ComponentModel.Container components = null;
public SlobodnoCrtanje()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new SlobodnoCrtanje()); }
private void SlobodnoCrtanje_MouseDown(object sender,
System.Windows.Forms.MouseEventArgs e)
{ crtaj=true;
xp=e.X;
yp=e.Y; }
private void SlobodnoCrtanje_MouseMove(object sender,
System.Windows.Forms.MouseEventArgs e)
{ if(crtaj)
{
Graphics g=CreateGraphics();
g.DrawLine(Pens.Blue,xp,yp,e.X,e.Y);
xp=e.X;
yp=e.Y;
g.Dispose();
}
}
private void SlobodnoCrtanje_MouseUp(object sender,
System.Windows.Forms.MouseEventArgs e)
{ crtaj=false; }}}
```

Primer 8f crtanje koncentričnih krugova

(generator slučajnih brojeva za različite boje)

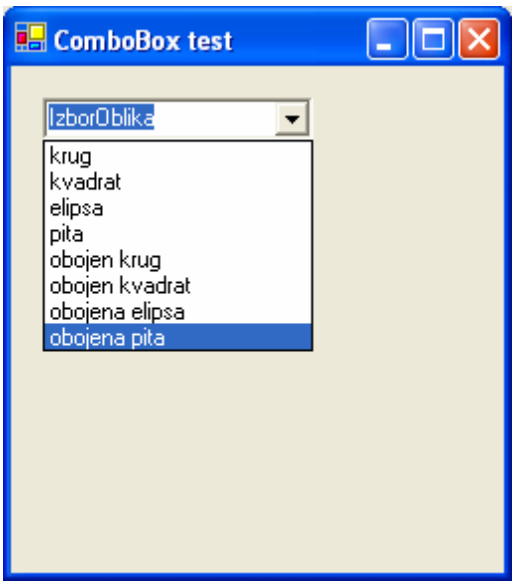

```
using System;
using System.Drawing;
using System.Collections;
using System.ComponentModel;
using System.Windows.Forms;
using System.Data;
namespace primer8f
{public class KoncKrugovi : System.Windows.Forms.Form
{
private System.Windows.Forms.Timer timer1;
private System.ComponentModel.IContainer components;
int r=0; // poluprecnik kruga
Random R=new Random();
public KoncKrugovi()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new KoncKrugovi()); }
private void timer1_Tick(object sender, System.EventArgs e)
{
Graphics g=CreateGraphics();
Pen olovka=new Pen(Color.Red);
olovka.Color=Color.FromArgb(R.Next(256), R.Next(256), R.Next(256));
int xc=ClientRectangle.Width/2; // odredjivanje centra kruga
int yc=ClientRectangle.Height/2;
r=r+10; // uvecavanje poluprecnika
if(xc-r<0 ||yc-r<0) // provera da li smo nacrtali krugove na celoj formi
{ // ako jesmo pocinjemo ispocetka
Refresh();
r=10;
}
g.DrawEllipse(olovka, xc-r, yc-r, 2*r,2*r);
olovka.Dispose();
g.Dispose();
}
private void KoncKrugovi_Resize(object sender, System.EventArgs e)
{ Refresh(); r=10; }}}
```

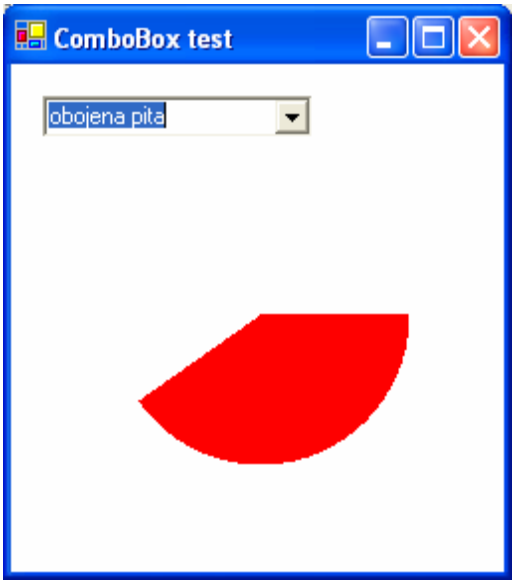
Primer 8g šrafiranje forme




```
using System;
using System.Drawing;
using System.Collections;
using System.ComponentModel;
using System.Windows.Forms;
using System.Data;
namespace primer8g
{public class srafura : System.Windows.Forms.Form
{
private System.Windows.Forms.Label label1;
private System.Windows.Forms.CheckBox cBHorizontal;
private System.Windows.Forms.CheckBox cBVertikal;
private System.Windows.Forms.PictureBox pictureBox1;
private System.Windows.Forms.NumericUpDown numUDN;
private System.Windows.Forms.Button btNacrtaj;
public srafura()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new srafura()); }
private void btNacrtaj_Click(object sender, System.EventArgs e)
{ int i;
int n=(int)numUDN.Value;
Graphics g = pictureBox1.CreateGraphics();
g.Clear(Color.White);
float dx=(float)pictureBox1.Width/n;
float dy=(float)pictureBox1.Height/n;
Pen olovka =new Pen(Color.Red, 2);
if (cBVertikal.Checked)
for(i=0;i<=n;i++)
g.DrawLine(olovka, i*dx,0,i*dx,pictureBox1.Height);
if (cBHorizontal.Checked)
for(i=0;i<=n;i++)
g.DrawLine(olovka, 0,i*dy,pictureBox1.Width,i*dy);
}
}
}
```

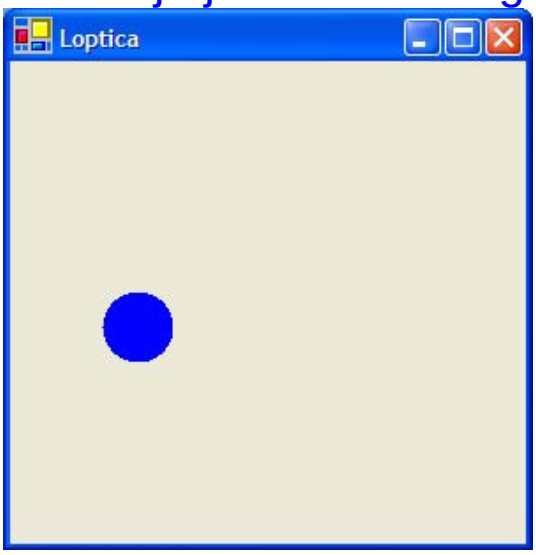
Primer 9 combobox





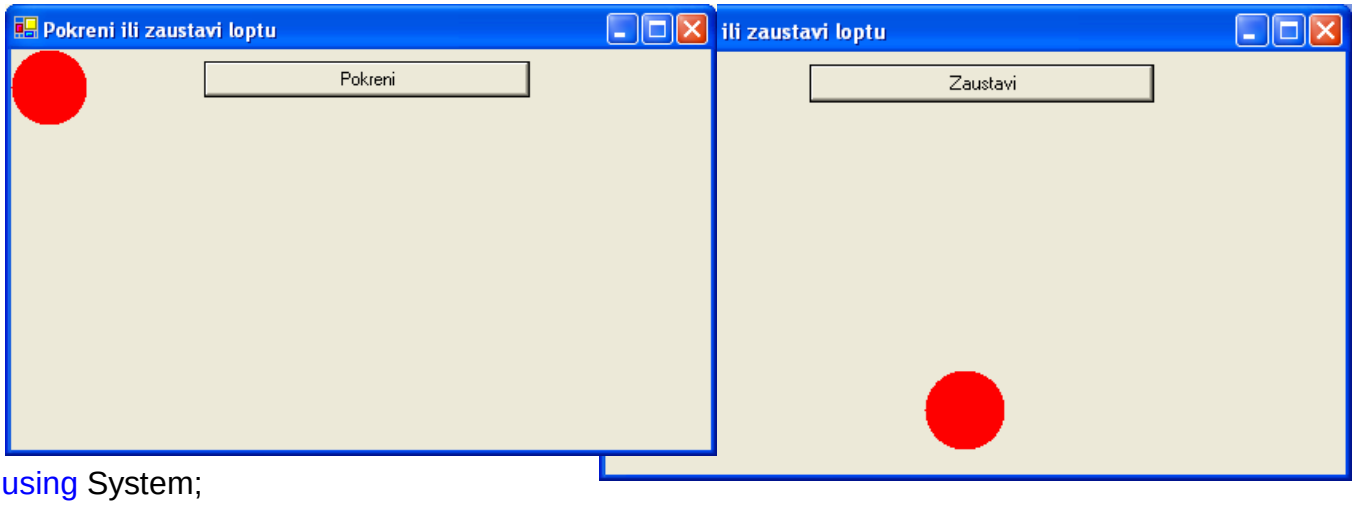

```
using System;
using System.Drawing;
using System.Collections;
using System.ComponentModel;
using System.Windows.Forms;
using System.Data;
namespace primer6d
{ public class combobox :
System.Windows.Forms.Form
{ private System.Windows.Forms.ComboBox
cBIzborOblika;
private System.ComponentModel.Container components = null;
public combobox()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new combobox()); }
private void cBIzborOblika_SelectedIndexChanged(object sender, System.EventArgs e)
{
Graphics g = CreateGraphics();
Pen olovka = new Pen(Color.Red);
SolidBrush cetka = new SolidBrush(Color.Red);
g.Clear(Color.White);
switch (cBIzborOblika.SelectedIndex)
{
case 0: g.DrawEllipse (olovka,50,50,150,150); break;
case 1: g.DrawRectangle (olovka,50,50,150,150); break;
case 2: g.DrawEllipse (olovka,50,85,150,115); break;
case 3: g.DrawPie (olovka,50,50,150,150,0,145); break;
case 4: g.FillEllipse (cetka,50,50,150,150); break;
case 5: g.FillRectangle (cetka,50,50,150,150); break;
case 6: g.FillEllipse (cetka,50,85,150,115); break;
case 7: g.FillPie (cetka,50,50,150,150,0,145); break;
}
olovka.Dispose();
cetka.Dispose();
g.Dispose();   }}}
```

Kreiranje jednostavnih igara Primer 10x – igra loptom



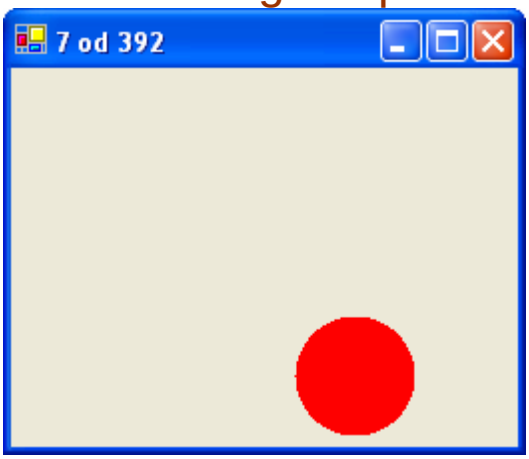

```
using System;
using System.Drawing;
using System.Collections;
using System.ComponentModel;
using System.Windows.Forms;
using System.Data;
namespace primer10x
{public class Form1 : System.Windows.Forms.Form
{
private System.Windows.Forms.Timer timer1;
private System.ComponentModel.IContainer components;
public Form1()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new Form1()); }
Random r= new Random();
private void timer1_Tick(object sender, System.EventArgs e)
{
Graphics g=CreateGraphics();
g.Clear(BackColor);
int x=r.Next(20, ClientRectangle.Width-20);
int y=r.Next(20, ClientRectangle.Height-20);
SolidBrush cetka=new SolidBrush(Color.Blue);
g.FillEllipse(cetka, x-20,y-20, 40, 40);
}
}
}
```

Primer 10 igra loptom 1




```
using System;
using System.Drawing;
using System.Collections;
using
System.ComponentModel;
using
System.Windows.Forms;
using System.Data;
namespace primer10
{
public class Igra_loptom1 : System.Windows.Forms.Form
{ SolidBrush cetka=new SolidBrush(Color.Red); //izbor cetke
int X=0, Y=0; //pocetne koordinate lopte
private System.Windows.Forms.Timer timer1;
private System.Windows.Forms.Button btKreniStani;
private System.ComponentModel.IContainer components;
public Igra_loptom1()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new Igra_loptom1()); }
private void Igra_loptom1_Paint(object sender, System.Windows.Forms.PaintEventArgs e)
{
Graphics g = e.Graphics;
g.FillEllipse(cetka,X,Y,50,50);
}
private void timer1_Tick(object sender, System.EventArgs e)
{
X+=20; //nove koordinate centra lopte
Y+=20;
X %= Width; //ako se izaslo iz forme, vracamo se unutra
Y %= Height;
Refresh(); //crtamo ispocetka
}
private void btKreniStani_Click(object sender, System.EventArgs e)
{
timer1.Enabled=!timer1.Enabled; //promena dozvole rada tajmera
if (timer1.Enabled) btKreniStani.Text="Zaustavi"; //promena teksta na dugmetu
else btKreniStani.Text="Pokreni";}}}
```

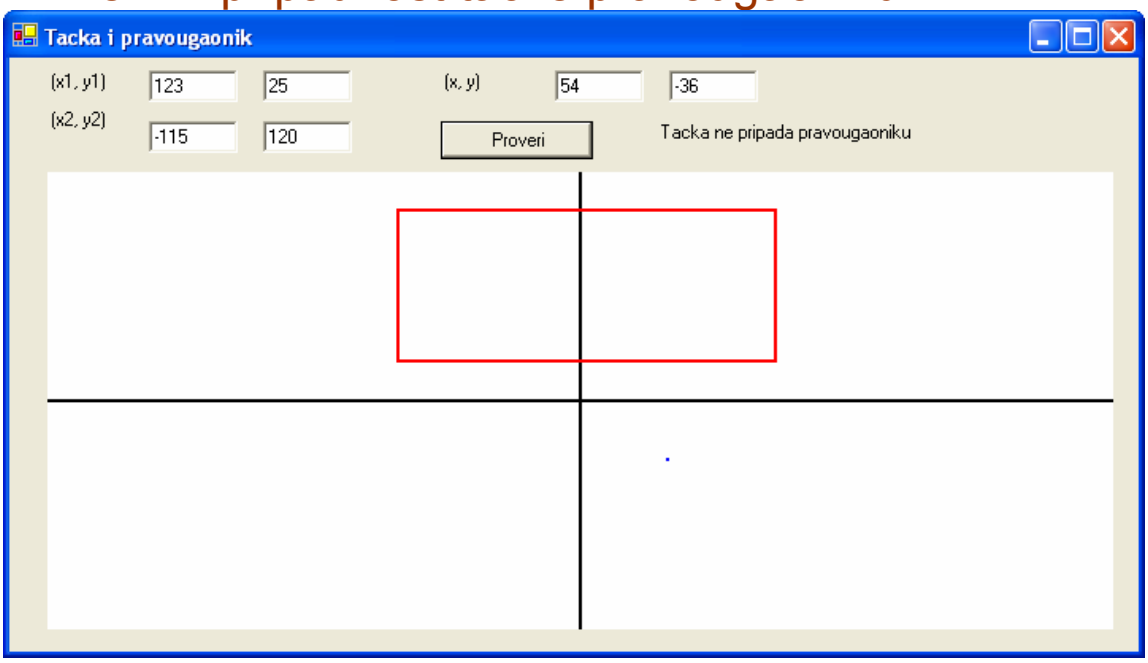
Primer 10a igra loptom




```
using System;
using System.Drawing;
using System.Collections;
using System.ComponentModel;
using System.Windows.Forms;
using System.Data;
namespace primer10a
{
public class Form1 : System.Windows.Forms.Form
{ // brPogodaka - broj krugova na koje je korisnik kliknuo
// brKrugova - broj ukupno iscrtanih krugova
int brPogodaka=0, brKrugova=0;
int xc, yc; // (xc,yc) centar kruga
Random R=new Random();
private System.Windows.Forms.Timer timer1; // probaj interval od 300 ili 500
private System.ComponentModel.IContainer components;
public Form1()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new Form1()); }
private void timer1_Tick(object sender, System.EventArgs e)
{
Refresh();
SolidBrush cetka=new SolidBrush(Color.Red);
Graphics g=CreateGraphics();
xc=R.Next(30,ClientRectangle.Width-30); // slucajan izbor centra kruga
yc=R.Next(30,ClientRectangle.Height-30);
g.FillEllipse(cetka,xc,yc,60,60); // krug je precnika 60, takav se moze uhvatiti
brKrugova++;
Text=brPogodaka.ToString()+" od "+brKrugova.ToString();
g.Dispose();
}
private void Form1_MouseDown(object sender, System.Windows.Forms.MouseEventArgs e)
{ // provera da li je korisnik kliknuo na krug
if (((e.X-xc)*(e.X-xc)+(e.Y-yc)*(e.Y-yc))<(60*60))
{ brPogodaka++;
//sledeci ispis je za slucaj da je neko kliknuo vise puta u jednom tiku
Text=brPogodaka.ToString()+" od "+brKrugova.ToString();
}}}}
```

Neki grafički primeri

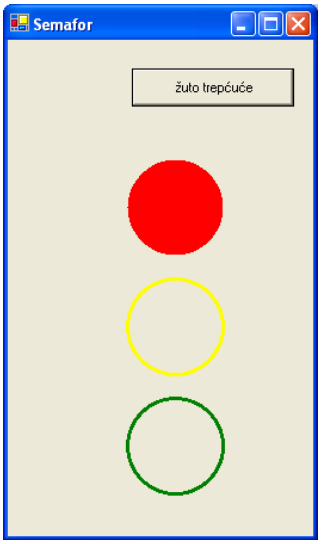
Primer 11 pripadnost tačke pravougaoniku




```
using System;
using System.Drawing;
using System.Collections;
using System.ComponentModel;
using System.Windows.Forms;
using System.Data;
namespace primer11
{public class PripadnostTacke : System.Windows.Forms.Form
{ private System.Windows.Forms.Label label1;
private System.Windows.Forms.Label label2;
private System.Windows.Forms.Label label3;
private System.Windows.Forms.TextBox tBX1;
private System.Windows.Forms.TextBox tBX2;
private System.Windows.Forms.TextBox tBY1;
private System.Windows.Forms.TextBox tBY2;
private System.Windows.Forms.TextBox tBX;
private System.Windows.Forms.TextBox tBY;
private System.Windows.Forms.Button btProveri;
private System.Windows.Forms.PictureBox pictureBox1;
private System.Windows.Forms.Label lIspis;
private System.ComponentModel.Container components = null;
public PripadnostTacke()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new PripadnostTacke()); }
private void btProveri_Click(object sender, System.EventArgs e)
{
Graphics g=pictureBox1.CreateGraphics();
g.Clear(Color.White);
Pen olovka=new Pen(Color.Black,2);
// odredjivanje centra objketa pictureBox1
int xc=pictureBox1.ClientRectangle.Width/2;
int yc=pictureBox1.ClientRectangle.Height/2;
// crtanje koordinatnih osa
g.DrawLine(olovka,xc,0,xc,2*yc);
```

```
g.DrawLine(olovka,0,yc,2*xc,yc);
int x1,y1,x2,y2,x,y,p;
// citanje koordinata temena dijagonala
x1=Convert.ToInt32(tBX1.Text);
y1=Convert.ToInt32(tBY1.Text);
x2=Convert.ToInt32(tBX2.Text);
y2=Convert.ToInt32(tBY2.Text);
// citanje koordinata tacke
x=Convert.ToInt32(tBX.Text);
y=Convert.ToInt32(tBY.Text);
// razmena vrednosti promenljivih x1,x2,y1,y2 tako da
// (x1,y1) predstavlja gornje levo teme a (x2,y2) donje desno teme
if(x1>x2) { p=x1; x1=x2; x2=p; }
if(y1<y2) { p=y1; y1=y2; y2=p; } // y tece u suprotnom smeru od osa!
olovka.Color=Color.Red; // crtanje pravougaonika
g.DrawRectangle(olovka, xc+x1, yc-y1, x2-x1, y1-y2);
olovka.Color=Color.Blue; // crtanje tacke
g.DrawEllipse(olovka, xc+x, yc-y, 1, 1);
// provera da li tacka pripada pravougaoniku
if(x1<=x && x<=x2 && y2<=y && y<=y1)
lIspis.Text="Tacka pripada pravougaoniku";
else
lIspis.Text="Tacka ne pripada pravougaoniku";
g.Dispose();
olovka.Dispose();
}
private void tbX1_TextChanged(object sender, System.EventArgs e)
{
pictureBox1.Refresh(); // brisanje prethodnog crteza
lIspis.Text=""; // brisanje sadrzaja objekta lIspis
}
}
}
```

Primer 12 semafor



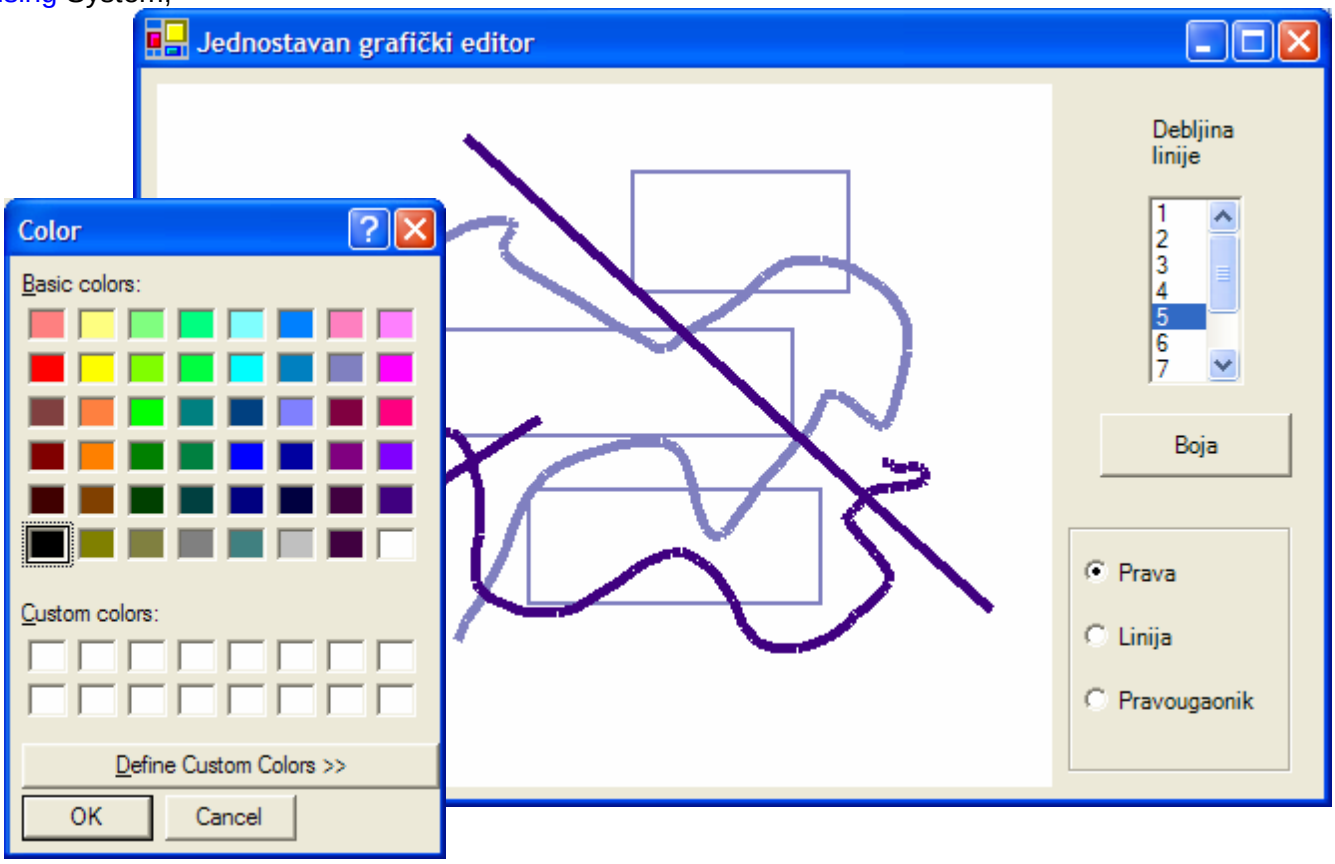

```
using System;
using System.Drawing;
using System.Collections;
using System.ComponentModel;
```

```
using System.Windows.Forms;
using System.Data;
namespace primer13
{public class Form1 : System.Windows.Forms.Form
{ int Stanje=1;
private System.Windows.Forms.Button bt1;
private System.Windows.Forms.Timer timer1;
private System.ComponentModel.IContainer components;
public Form1()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new Form1()); }
private void bt1_Click(object sender, System.EventArgs e)
{ if (bt1.Text=="žuto trepćuće")
{ Stanje=4; bt1.Text="normalan režim"; }
else
{ Stanje=1; bt1.Text="žuto trepćuće"; }
Refresh(); }
private void crtajKrug(string Boja,bool pun,int X,int Y,int Precnik)
{ Graphics g=this.CreateGraphics();
Color c=new Color();
if (Boja=="crveni") c=Color.Red;
else if (Boja=="zuti")c=Color.Yellow;
else c=Color.Green;
if (pun) { SolidBrush cetka=new SolidBrush(c);
g.FillEllipse(cetka,X,Y,Precnik,Precnik); }
else { Pen olovka=new Pen(c,3);
g.DrawEllipse(olovka,X,Y,Precnik,Precnik); }
g.Dispose(); }
private void Form1_Paint_1(object sender, System.Windows.Forms.PaintEventArgs e)
{ switch (Stanje)
{
case 1: timer1.Interval=4500;
crtajKrug("crveni",true,100,100,80);
crtajKrug("zuti",false,100,200,80);
crtajKrug("zeleni",false,100,300,80);
Stanje=2;
break;
case 2: timer1.Interval=500;
crtajKrug("crveni",true,100,100,80);
crtajKrug("zuti",true,100,200,80);
crtajKrug("zeleni",false,100,300,80);
Stanje=3;
break;
case 3: timer1.Interval=4500;
crtajKrug("crveni",false,100,100,80);
crtajKrug("zuti",false,100,200,80);
crtajKrug("zeleni",true,100,300,80);
Stanje=4;
break;
case 4: timer1.Interval=500;
crtajKrug("crveni",false,100,100,80);
crtajKrug("zuti",true,100,200,80);
crtajKrug("zeleni",false,100,300,80);
```

```
if (bt1.Text=="žuto trepćuće") Stanje=1;
else Stanje=5;
break;
case 5: timer1.Interval=500;
crtajKrug("crveni",false,100,100,80);
crtajKrug("zuti",false,100,200,80);
crtajKrug("zeleni",false,100,300,80);
Stanje=4;
break;
}
}
private void timer1_Tick(object sender, System.EventArgs e)
{ Refresh(); }}}
```

Primer 13a jednostavan grafički editor

```
using System;
```




```
using System.Drawing;
using System.Collections;
using System.ComponentModel;
using System.Windows.Forms;
using System.Data;
namespace primer13a
{
public class Form1 : System.Windows.Forms.Form
{ private System.Windows.Forms.PictureBox pictureBox1;
private System.Windows.Forms.ListBox lBDebljina;
private System.Windows.Forms.Label label1;
private System.Windows.Forms.Button btBoja;
private System.Windows.Forms.GroupBox groupBox1;
private System.Windows.Forms.RadioButton rBPrava;
private System.Windows.Forms.RadioButton rBLinija;
private System.Windows.Forms.ColorDialog colorDialog1;
```

```
private System.Windows.Forms.RadioButton rBPravougaonik;
private System.ComponentModel.Container components = null;
public Form1()
{ InitializeComponent(); }
static void Main()
{ Application.Run(new Form1()); }
Pen olovka = new Pen(Color.Black,1);
int xpre, ypre;
bool crtanje=false; //da li treba crtati u mousemove dogadjaju
private void pictureBox1_MouseDown(object sender, System.Windows.Forms.MouseEventArgs e)
{
xpre=e.X;
ypre=e.Y;
crtanje=true;
}
private void pictureBox1_MouseUp(object sender, System.Windows.Forms.MouseEventArgs e)
{
crtanje=false;
if (rBPrava.Checked)
{
Graphics g=pictureBox1.CreateGraphics();
g.DrawLine(olovka, xpre, ypre, e.X, e.Y);
}
else if (rBPravougaonik.Checked)
{
Graphics g=pictureBox1.CreateGraphics();
g.DrawRectangle(olovka,
Math.Min(xpre, e.X),
Math.Min(ypre, e.Y),
Math.Abs(e.X-xpre),Math.Abs(e.Y-ypre));
}
}
private void pictureBox1_MouseMove(object sender, System.Windows.Forms.MouseEventArgs e)
{
if (crtanje==true && rBLinija.Checked)
{
Graphics g=pictureBox1.CreateGraphics();
g.DrawLine(olovka, xpre, ypre, e.X, e.Y);
xpre=e.X;
ypre=e.Y;
}
}
private void btBoja_Click(object sender, System.EventArgs e)
{
colorDialog1.ShowDialog();
olovka.Color=colorDialog1.Color;
}
private void lBDebljina_SelectedIndexChanged(object sender, System.EventArgs e)
{
olovka.Width=Convert.ToInt32(lBDebljina.SelectedItem);
}
}
}
```