CS 557
Homework #1
Due Thursday, 3 September 2009

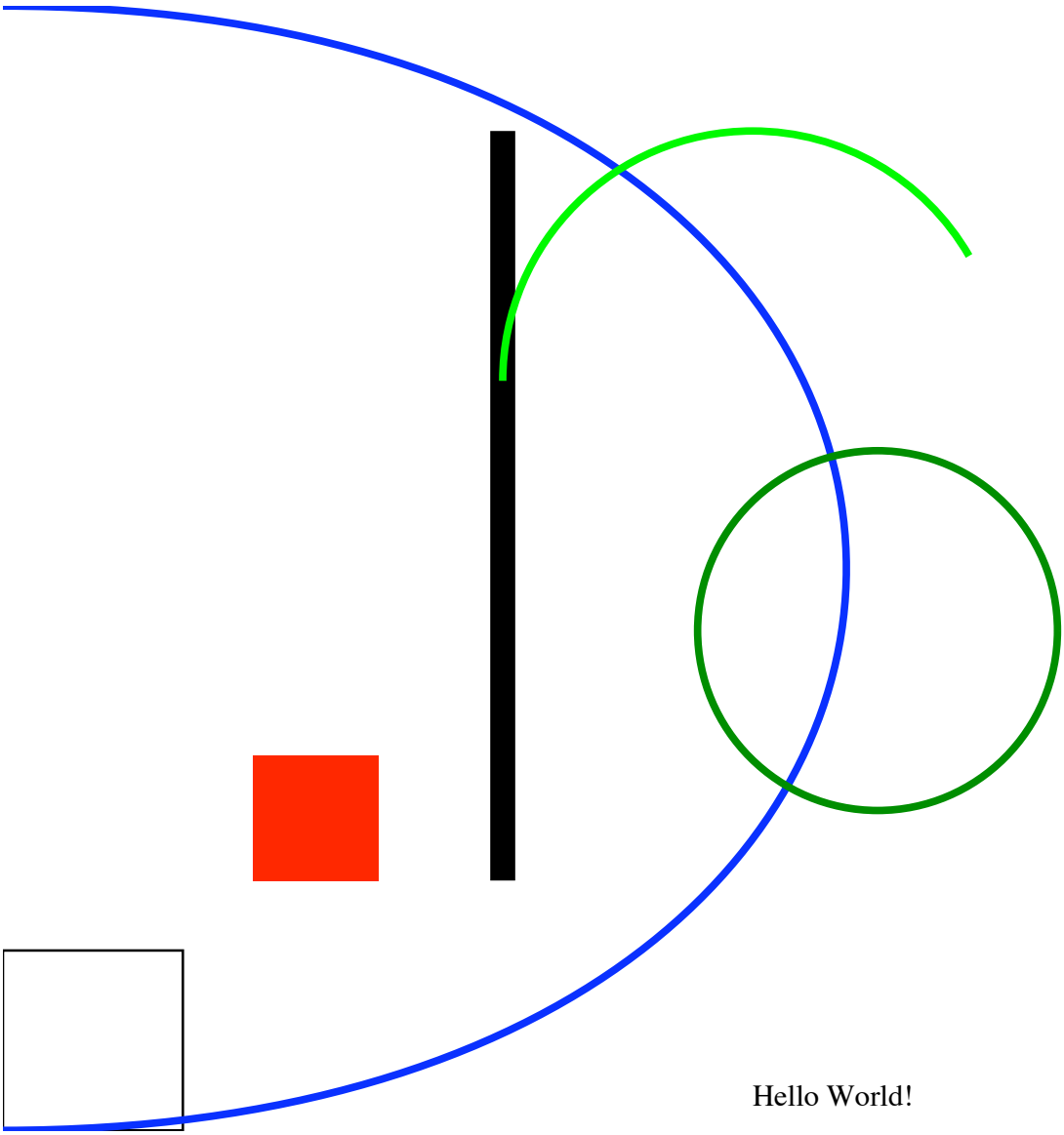
1. Create a drawing using PostScript. Your PostScript file should contain at least one occurrence of the following commands:
moveto, lineto, stroke, curveto, newpath, closepath, fill, setgrbcolor, setlinewidth, arc, findfont, scalefont, setfont, show

The following PostScript program illustrates how these commands are used:

```
%!PS-Adobe-2.0 EPSF-1.2
%%BoundingBox: 0 0 432 432

newpath           % create a new path
0 0 moveto        % move cursor to the origin
72 0 lineto       % draw path to (72,0), which equals (1,0) in inches
72 72 lineto      % draw path to (72,72), which equals (1,1) in inches
0 72 lineto
closepath         % closes the path back to (0,0)
stroke            % draw the square

1 0 0 setrgbcolor % Change the color to red

newpath
100 100 moveto
150 100 lineto
150 150 lineto
100 150 lineto
closepath
fill % fills in the square with the current color (red)

0 0 0 setrgbcolor % change the color back to black

10 setlinewidth % change the line width to be 10 points wide (=10/72 of an inch)
200 100 moveto 200 400 lineto stroke   % Draw a thick vertical line

0 0 1 setrgbcolor % Set color to blue
3 setlinewidth
0 0 moveto 450 0   450 450   0 450   curveto stroke
% Draw a cubic Bezier curve whose control points are (0,0), (450,0), (450,450), (0,450)

0 1 0 setrgbcolor % Set color to green
newpath
300 300 100 30 180 arc stroke % Draw a circular arc whose center is (300,300), Radius = 100,
% starting with theta = 30 degrees, ending at theta = 180 degrees

0 .5 0 setrgbcolor
newpath
350 200 72 0 360 arc stroke % Draw complete circle, center = (350,200); radius = 72

/Times-Roman findfont 12 scalefont setfont % Declare the current font to be 12 point Times roman
```

```
0 0 0 setrgbcolor
300 10 moveto % Move cursor to (300,10)
(Hello World!) show % Print the string "Hello World!"
```

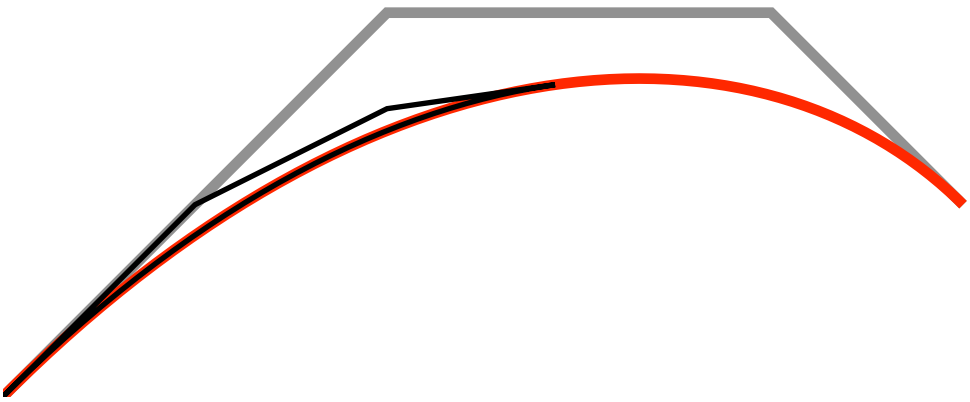
Here is the drawing that results from executing this PostScript program:



2. Given a cubic Bézier curve $\mathbf{P}_{[0,1]}(t)$ with control points (0,0), (144, 144), (288,144), (360,72), subdivide the curve at $t = \frac{1}{2}$. Draw $\mathbf{P}_{[0,1]}(t)$ and $\mathbf{P}_{[0,\frac{1}{2}]}(t)$ and their control polygons using PostScript, as outlined in the following PostScript program:

```
%!PS-Adobe-2.0 EPSF-1.2
%%BoundingBox: 0 0 432 200

% Draw a Bezier curve with control points (0,0), (144, 144), (288,144), (360,72)
.5 .5 .5 setrgbcolor
4 setlinewidth
0 0 moveto 144 144 lineto 288 144 lineto 360 72 lineto stroke
1 0 0 setrgbcolor
0 0 moveto 144 144 288 144 360 72 curveto stroke

% Subdivide the curve at t = 1/2, using the de Casteljau algorithm
% Draw the Bezier curve for [0,1/2] and its control polygon

2 setlinewidth
0 0 0 setrgbcolor
0 0 moveto x1 y1 x2 y2 x3 y3 curveto stroke
0 0 moveto x1 y1 lineto  x2 y2 lineto x3 y3 lineto stroke
```

Your job is to compute the values of x1, y1, x2, y2, x3, and y3 and place them into the PostScript program. The resulting figure should look like this:



For 1) and 2), produce a pdf file of these two PostScript files using Ghostscript (on windows) or Preview (on Macintosh). Email the two PostScript source files and the two pdf files to tom@cs.byu.edu by midnight on 8 January. The PostScript files should have an extension of .eps and the pdf files should have a .pdf extension.

Additional information on PostScript can be found in the PostScript Language Tutorial and Cookbook which can be downloaded from www-cdf.fnal.gov/offline/PostScript/BLUEBOOK.PDF.