CSE 5542 - Realtime Rendering

Homework #1 Implicit functions to create backgrounds

Date: Tuesday, August 29, 2017

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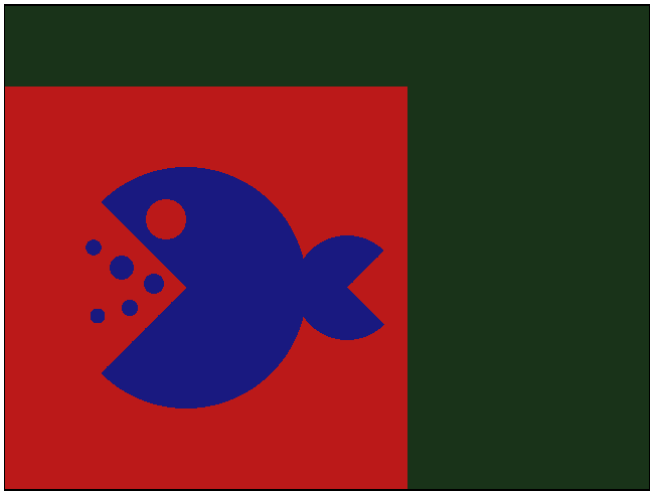
1. Adidas logo

I am trying to draw the irregular plot by circle and limitations.

2. Fish

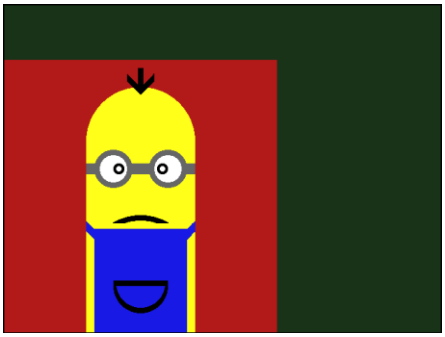


With circle and graphic tools, I try to draw an simple animal.

3. Hexagram

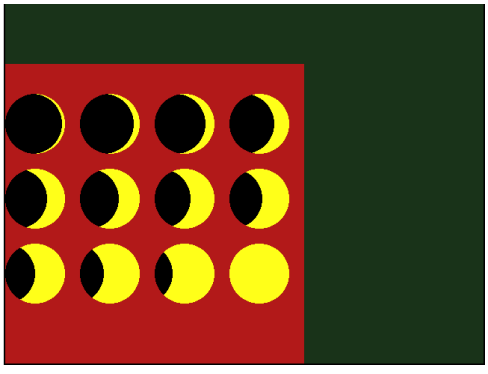
I use limitations of lines to draw the hexagram.

4. Minions



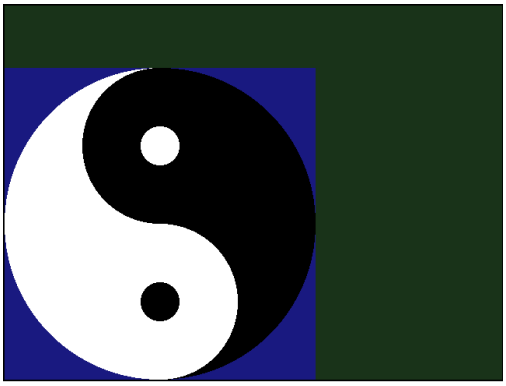
It is my favorite one. This plot combines everything including lines, circles, and limitations.

5. Moon circle



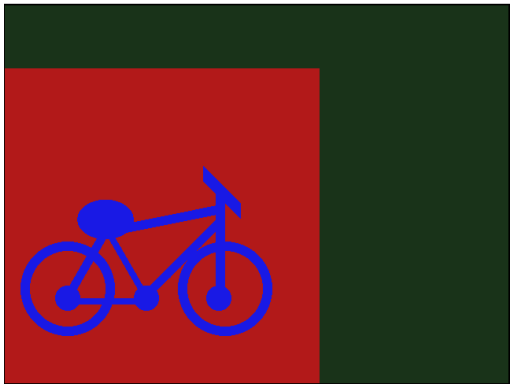
I try to repeat something and change it a little bit when in next circle.

6. Yin-Yang



This is the example provided by professor. It lets me understand how java works with if and else.

7. bicycle



With lots of lines and circles, I try to present a bicycle in this plot.

Conclusion:

I think that GPU, browser, and webGL were worked in this homework. I have countered an issue that weird error. We must provide "1.0" rather than "1" to webGL. Otherwise, it results in error all the time. And, I understand the statement that a Fragment Shader is the Shader stage that will process a Fragment generated by the Rasterization into a set of colors and a single depth value.

Picture number	Fragment Shader

1	<script id="SMY_hw1_fs" type="x-shader/x-fragment">
	precision highp float;
	void main(void) {
	float yThreshold;
	float xThreshold;
	const float xScale = 1.0 / 400.0;
	const float yScale = 1.0 / 400.0;
	const vec4 scarlet = vec4(0.733, 0.1, 0.1, 1.0);
	const vec4 grey = vec4(0.4, 0.4, 0.4, 1.0);
	const vec4 blue = vec4(0.1, 0.1, 0.5, 1.0);
	float x = xScale * gl_FragCoord.x;
	float y = yScale * gl_FragCoord.y;
	vec4 color;
	yThreshold = 30.0*(sin(40.0 * 3.1415*x) + 1.0);
	xThreshold = 30.0*(cos(40.0 * 3.1415*y) + 1.0);
	
	if(((x-0.25)*(x-0.25)+(y-0.65)*(y-0.65)<0.1225&&(x-0.75)*(x-0.75)+(y-0.65)*(y-0.65)<0.1225
	|| (x-0.6)*(x-0.6)+(y-0.75)*(y-0.75)<0.1225&&(x-0.95)*(x-0.95)+(y-0.4)*(y-0.4)<0.1225
	|| (x-0.4)*(x-0.4)+(y-0.75)*(y-0.75)<0.1225&&(x-0.05)*(x-0.05)+(y-0.4)*(y-0.4)<0.1225)
	&&((y>0.53)||(y<0.5&&y>0.47)||(y<0.44)))
	color = blue;
	
	else
	color = scarlet;
	
	gl_FragColor = color;
	}
	</script>

2	<script id="SMY_hw1_fs" type="x-shader/x-fragment">
	precision highp float;
	void main(void) {
	float yThreshold;
	float xThreshold;
	const float xScale = 1.0 / 400.0;
	const float yScale = 1.0 / 400.0;
	const vec4 scarlet = vec4(0.733, 0.1, 0.1, 1.0);
	const vec4 grey = vec4(0.4, 0.4, 0.4, 1.0);
	const vec4 blue = vec4(0.1, 0.1, 0.5, 1.0);
	float x = xScale * gl_FragCoord.x;
	float y = yScale * gl_FragCoord.y;
	vec4 color;
	yThreshold = 30.0*(sin(40.0 * 3.1415*x) + 1.0);
	xThreshold = 30.0*(cos(40.0 * 3.1415*y) + 1.0);
	
	if((((x-0.45)*(x-0.45)+(y-0.5)*(y-0.5)<0.09)
	&&((0.95-x<y)||(x+0.05>y))
	&&((x-0.4)*(x-0.4)+(y-0.67)*(y-0.67)>0.0025)
	)
	||(((x-0.85)*(x-0.85)+(y-0.5)*(y-0.5)<0.0169)
	&&((x-0.35<y)||(y<1.35-x)))
	||((x-0.29)*(x-0.29)+(y-0.55)*(y-0.55)<0.0009)
	||((x-0.31)*(x-0.31)+(y-0.45)*(y-0.45)<0.00042)
	||((x-0.22)*(x-0.22)+(y-0.60)*(y-0.60)<0.00038)
	||((x-0.37)*(x-0.37)+(y-0.51)*(y-0.51)<0.000625)
	||((x-0.23)*(x-0.23)+(y-0.43)*(y-0.43)<0.00035)
	)
	color = blue;

	else
	color = scarlet;
	
	gl_FragColor = color;
	}
	</script>

3	<script id="SMY_hw1_fs" type="x-shader/x-fragment">
	precision highp float;
	void main(void) {
	float yThreshold;
	float xThreshold;
	const float xScale = 1.0 / 400.0;
	const float yScale = 1.0 / 400.0;
	const vec4 scarlet = vec4(1.0, 1.0, 1.0, 1.0);
	const vec4 grey = vec4(0.4, 0.4, 0.4, 1.0);
	const vec4 blue = vec4(0.1, 0.1, 0.5, 1.0);
	float x = xScale * gl_FragCoord.x;
	float y = yScale * gl_FragCoord.y;
	vec4 color;
	yThreshold = 30.0*(sin(40.0 * 3.1415*x) + 1.0);
	xThreshold = 30.0*(cos(40.0 * 3.1415*y) + 1.0);
	
	if((y<1.732*x-0.066 && y>1.732*x-0.166&&x<0.5&&y>0.3)||
	(y<0.35&&y>0.3&&y<1.732*x-0.066&&y<1.666-1.732*x)||
	(y<1.666-1.732*x&&x>0.5&&y>0.3&&y>1.566-1.732*x)||
	(y<0.6&&y>0.55&&y>0.966-1.732*x&&y>1.732*x-0.766)||
	(y>0.966-1.732*x&&y<1.066-1.732*x&&x<0.5&&y<0.6)||
	(y>1.732*x-0.766&&y<1.732*x-0.666&&x>0.5&&y<0.6)||
	(y>0.8)||(y<0.1))
	color = blue;
	
	else
	color = scarlet;
	
	gl_FragColor = color;
	}
	</script>

4	<script id="SMY_hw1_fs" type="x-shader/x-fragment">
	precision highp float;
	void main(void) {
	float yThreshold;
	float xThreshold;
	const float xScale = 1.0 / 400.0;
	const float yScale = 1.0 / 400.0;
	const vec4 scarlet = vec4(0.7, 0.1, 0.1, 1.0);
	const vec4 grey = vec4(0.4, 0.4, 0.4, 1.0);
	const vec4 yellow = vec4(1.0, 1.0, 0.1, 1.0);
	const vec4 white= vec4(1.0, 1.0, 1.0, 1.0);
	const vec4 black= vec4(0.0, 0.0, 0.0, 0.0);
	const vec4 blue = vec4(0.1, 0.1, 0.9, 1.0);
	float x = xScale * gl_FragCoord.x;
	float y = yScale * gl_FragCoord.y;
	vec4 color;
	yThreshold = 30.0*(sin(40.0 * 3.1415*x) + 1.0);
	xThreshold = 30.0*(cos(40.0 * 3.1415*y) + 1.0);
	if ((x-0.5)*(x-0.5)+(y-0.7)*(y-0.7)<0.04||
	(x>0.3&&x<0.7&&y<0.7)){
	color = yellow;
	if(((x-0.4)*(x-0.4)+(y-0.6)*(y-0.6)<0.0049&&
	(x-0.4)*(x-0.4)+(y-0.6)*(y-0.6)>0.0025)||
	(x>0.3&&x<0.34&&0.58<y&&y<0.62)||
	(x>0.45&&x<0.55&&0.58<y&&y<0.62)||
	(x>0.65&&x<0.70&&0.58<y&&y<0.62))
	color = grey;

```
                                        if((x-0.6)*(x-0.6)+(y-0.6)*(y-0.6)<0.0049&&
                                                (x-0.6)*(x-0.6)+(y-0.6)*(y-0.6)>0.0025)
                                                color = grey;
                                        if((x-0.4)*(x-0.4)+(y-0.6)*(y-0.6)<0.0025)
                                                color = white;
                                        if((x-0.6)*(x-0.6)+(y-0.6)*(y-0.6)<0.0025)
                                                color = white;
                                        if(((x>0.33&&x<0.67&&y<0.38)||((y<0.71-x)&&(y>0.67-x)&&x<0.5))||
                                                ((y<x-0.29)&&x>0.5&&y>x-0.33))
                                                color =blue;
                                        if(((x-0.42)*(x-0.42)+(y-0.6)*(y-0.6)<0.0004&&
                                          (x-0.42)*(x-0.42)+(y-0.6)*(y-0.6)>0.0001)||
                                          ((x-0.58)*(x-0.58)+(y-0.6)*(y-0.6)<0.0004&&
                                          (x-0.58)*(x-0.58)+(y-0.6)*(y-0.6)>0.0001)||
                                          (((x-0.5)*(x-0.5)+(y-0.23)*(y-0.23)<0.04)&&
                                          ((x-0.5)*(x-0.5)+(y-0.23)*(y-0.23)>0.0324)&&y>0.40)||
                                                (((x-0.5)*(x-0.5)+(y-0.17)*(y-0.17)<0.01)&&
                                                (x-0.5)*(x-0.5)+(y-0.18)*(y-0.18)>0.0081&&y<0.17)||
                                                (x<0.6&&x>0.4&&y>0.17&&y<0.19)||
                                                (x<0.51&&x>0.49&&y>0.88&&y<0.9)||
                                                (x>0.45&&x<0.5&&y>1.37-x&&y<1.4-x)||
                                                (x>0.5&&x<0.55&&y>x+0.37&&y<x+0.4))
                                                color = black;

                                }
                                else
                                        if((x<0.51&&x>0.49&&y>0.9&&y<0.97)||
                                                (x>0.45&&x<0.5&&y>1.37-x&&y<1.4-x)||
                                                (x>0.5&&x<0.55&&y>x+0.37&&y<x+0.4))
                                                color= black;
                                        else
                                        color = scarlet;


        gl_FragColor = color;
    }
  </script>
```

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```
  <script id="SMY_hw1_fs" type="x-shader/x-fragment">
    precision highp float;
    void main(void) {
        float yThreshold;
                                float xThreshold;
      const float xScale = 1.0 / 400.0;
      const float yScale = 1.0 / 400.0;
      const vec4 scarlet = vec4(0.7, 0.1, 0.1, 1.0);
      const vec4 grey = vec4(0.4, 0.4, 0.4, 1.0);
                                const vec4 yellow = vec4(1.0, 1.0, 0.1, 1.0);
                                const vec4 white= vec4(1.0, 1.0, 1.0, 1.0);
                                const vec4 black= vec4(0.0, 0.0, 0.0, 0.0);
                                const vec4 blue = vec4(0.1, 0.1, 0.9, 1.0);
      float x = xScale * gl_FragCoord.x;
      float y = yScale * gl_FragCoord.y;
      vec4 color;
        yThreshold = 30.0*(sin(40.0 * 3.1415*x) + 1.0);
                                xThreshold = 30.0*(cos(40.0 * 3.1415*y) + 1.0);
                                if((x-0.1)*(x-0.1)+(y-0.8)*(y-0.8)<0.01||
                                        ((x-0.35)*(x-0.35)+(y-0.8)*(y-0.8)<0.01)||
                                        ((x-0.6)*(x-0.60)+(y-0.8)*(y-0.8)<0.01)||
                                        ((x-0.85)*(x-0.85)+(y-0.8)*(y-0.8)<0.01)||
                                        /* second line moon*/
                                        ((x-0.1)*(x-0.1)+(y-0.55)*(y-0.55)<0.01)||
                                        ((x-0.35)*(x-0.35)+(y-0.55)*(y-0.55)<0.01)||
                                        ((x-0.6)*(x-0.6)+(y-0.55)*(y-0.55)<0.01)||
                                        ((x-0.85)*(x-0.85)+(y-0.55)*(y-0.55)<0.01)||
                                        /* third line moon*/
                                        ((x-0.1)*(x-0.1)+(y-0.3)*(y-0.3)<0.01)||
                                        ((x-0.35)*(x-0.35)+(y-0.3)*(y-0.3)<0.01)||
                                        ((x-0.6)*(x-0.6)+(y-0.3)*(y-0.3)<0.01)||
                                        ((x-0.85)*(x-0.85)+(y-0.3)*(y-0.3)<0.01)
                                        ){
```

```
                                        color = yellow;
                                        if((x-0.09)*(x-0.09)+(y-0.8)*(y-0.8)<0.01||
                                          ((x-0.33)*(x-0.33)+(y-0.8)*(y-0.8)<0.01)||
                                          ((x-0.57)*(x-0.57)+(y-0.8)*(y-0.8)<0.01)||
                                          ((x-0.80)*(x-0.80)+(y-0.8)*(y-0.8)<0.01)||
                                          ((x-0.04)*(x-0.04)+(y-0.55)*(y-0.55)<0.01)||
                                          ((x-0.28)*(x-0.28)+(y-0.55)*(y-0.55)<0.01&&x>0.25)||
                                          ((x-0.52)*(x-0.52)+(y-0.55)*(y-0.55)<0.01&&x>0.5)||
                                          ((x-0.76)*(x-0.76)+(y-0.55)*(y-0.55)<0.01&&x>0.75)||
                                          (x)*(x)+(y-0.3)*(y-0.3)<0.01||
                                          ((x-0.23)*(x-0.23)+(y-0.3)*(y-0.3)<0.01&&x>0.25)||
                                          ((x-0.46)*(x-0.46)+(y-0.3)*(y-0.3)<0.01&&x>0.5)
                                          )
                                                color = black;

                                }
                                else
                                        color = scarlet;


        gl_FragColor = color;
    }
</script>
```

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```
<script id="SMY_hw1_fs" type="x-shader/x-fragment">
   precision highp float;
   void main(void) {
        float yThreshold;
                                float xThreshold;
          const float xScale = 1.0 / 400.0;
          const float yScale = 1.0 / 400.0;
          const vec4 scarlet = vec4(1.0, 1.0, 1.0, 1.0);
          const vec4 grey = vec4(0.0, 0.0, 0.0, 1.0);
                                const vec4 blue = vec4(0.1, 0.1, 0.5, 1.0);
          float x = xScale * gl_FragCoord.x;
          float y = yScale * gl_FragCoord.y;
          vec4 color;
        yThreshold = 30.0*(sin(40.0 * 3.1415*x) + 1.0);
                                xThreshold = 30.0*(cos(40.0 * 3.1415*y) + 1.0);

        /* first step*/
        if(x >0.5)
                                        if((x-0.5)*(x-0.5)+(y-0.5)*(y-0.5)<0.25)
                                                color = grey;
                                        else
                                                color = blue;


      if(x <0.5)
                                        if((x-0.5)*(x-0.5)+(y-0.5)*(y-0.5)<0.25)
                                                color = scarlet;
                                        else
                                                color = blue;
        /* Second step*/
                                if(x <0.5)
                                        if((x-0.5)*(x-0.5)+(y-0.75)*(y-0.75)<0.0625)
                                                color = grey;
                                if(x >0.5)
                                        if((x-0.5)*(x-0.5)+(y-0.25)*(y-0.25)<0.0625)
                                                color = scarlet;
        /* Third step*/
                                if ((x-0.5)*(x-0.5)+(y-0.75)*(y-0.75)<0.00390625)
                                        color = scarlet;
                                if ((x-0.5)*(x-0.5)+(y-0.25)*(y-0.25)<0.00390625)
                                        color = grey;




        gl_FragColor = color;
```

	} </script>

7	<script id="SMY_hw1_fs" type="x-shader/x-fragment">
	precision highp float;
	void main(void) {
	float yThreshold;
	float xThreshold;
	const float xScale = 1.0 / 400.0;
	const float yScale = 1.0 / 400.0;
	const vec4 scarlet = vec4(0.7, 0.1, 0.1, 1.0);
	const vec4 grey = vec4(0.4, 0.4, 0.4, 1.0);
	const vec4 yellow = vec4(1.0, 1.0, 0.1, 1.0);
	const vec4 white= vec4(1.0, 1.0, 1.0, 1.0);
	const vec4 black= vec4(0.0, 0.0, 0.0, 0.0);
	const vec4 blue = vec4(0.1, 0.1, 0.9, 1.0);
	float x = xScale * gl_FragCoord.x;
	float y = yScale * gl_FragCoord.y;
	vec4 color;
	yThreshold = 30.0*(sin(40.0 * 3.1415*x) + 1.0);
	xThreshold = 30.0*(cos(40.0 * 3.1415*y) + 1.0);
	
	if (((x-0.2)*(x-0.2)+(y-0.3)*(y-0.3)<0.0225&&
	(x-0.2)*(x-0.2)+(y-0.3)*(y-0.3)>0.0144)||
	((x-0.7)*(x-0.7)+(y-0.3)*(y-0.3)<0.0225&&
	(x-0.7)*(x-0.7)+(y-0.3)*(y-0.3)>0.0144)||
	(y<1.732*x-0.0464&&y>1.732*x-0.1&&x<0.32&&x>0.2)||
	(x<0.45&&x>0.2&&y>0.25&&y<0.27)||
	(y>1.03-1.732*x&&y<1.07-1.732*x&&x<0.45&&x>0.30)||
	(0.5*(x-0.32)*(x-0.32)+(y-0.52)*(y-0.52)<0.004)||
	(y<x-0.15&&y>x-0.19&&x>0.45&&x<0.7)||
	(x>0.67&&x<0.7&&y<0.6&&y>0.25)||
	(y>0.2*x+0.4&&y<0.2*x+0.43&&x>0.32&&x<0.7)||
	(y>1.27-x&&y<1.32-x&&x>0.63&&x<0.75)||
	((x-0.2)*(x-0.2)+(y-0.27)*(y-0.27)<0.0016)||
	((x-0.45)*(x-0.45)+(y-0.27)*(y-0.27)<0.0016)||
	((x-0.68)*(x-0.68)+(y-0.27)*(y-0.27)<0.0016)
	)
	color = blue;
	
	else
	color = scarlet;
	
	gl_FragColor = color;
	}
	</script>