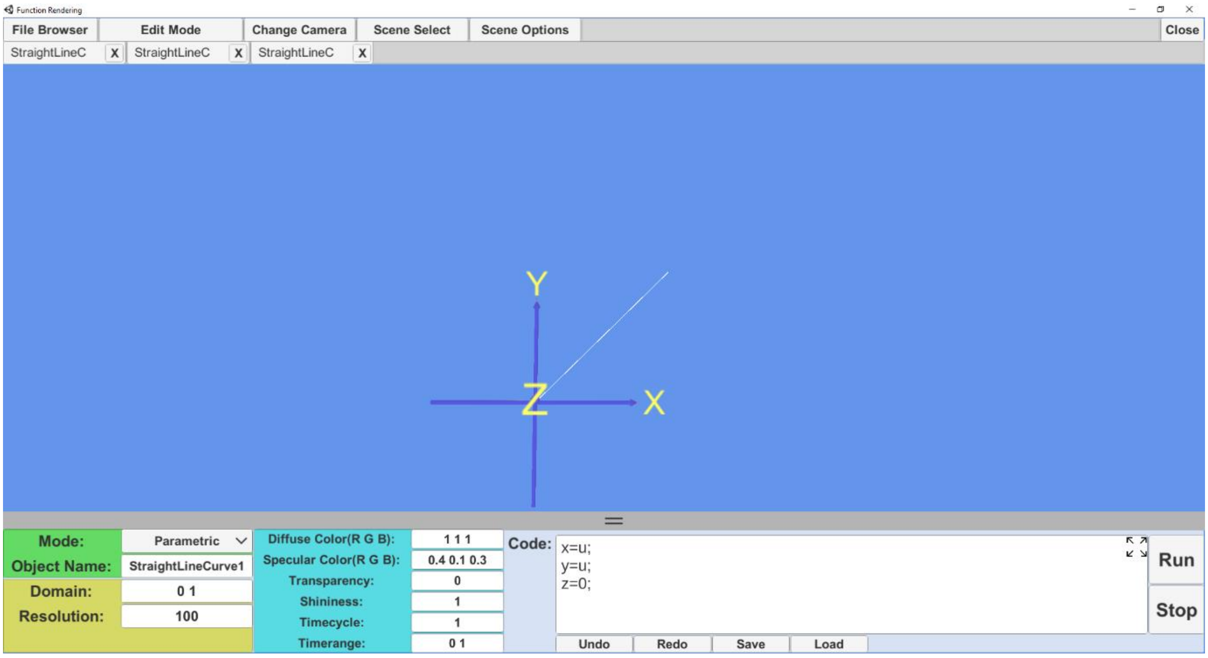
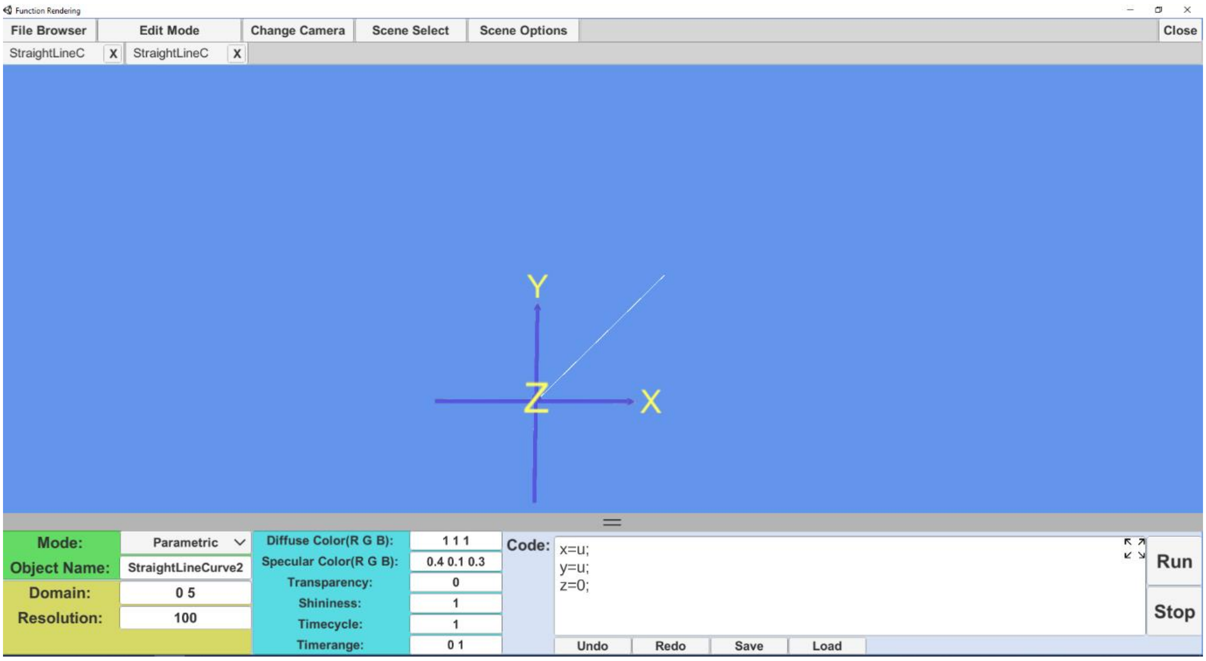
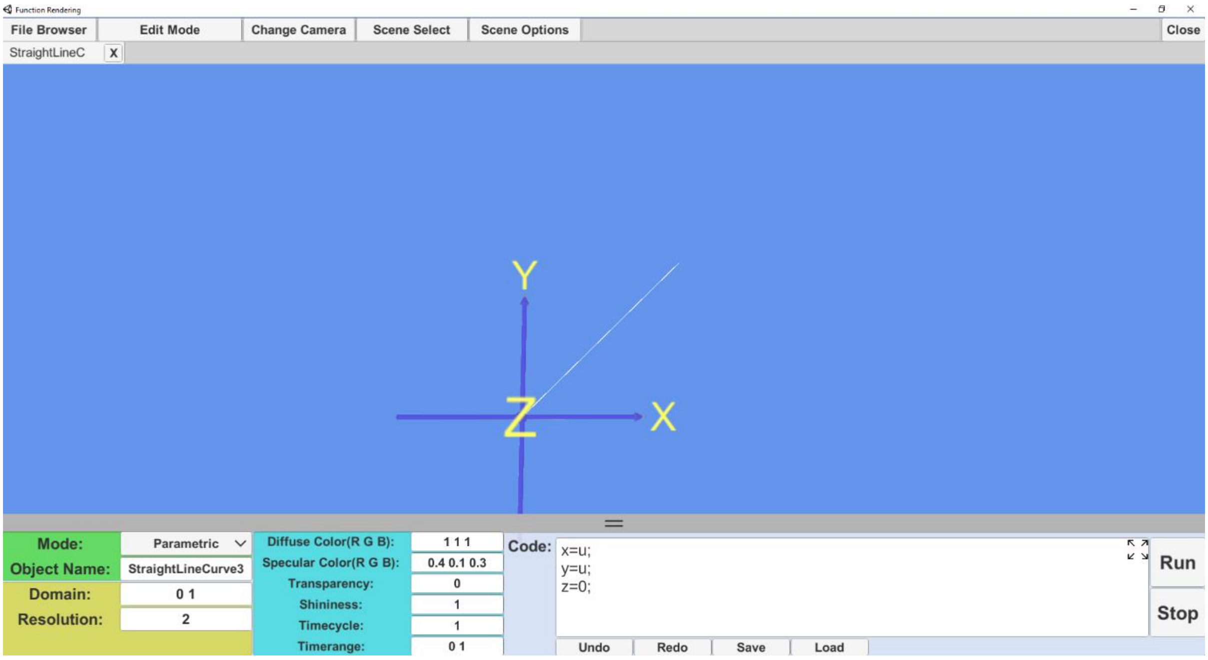
Straight Line Segment



Curve 1



Curve 2



Curve 3

Curve No.	Notes

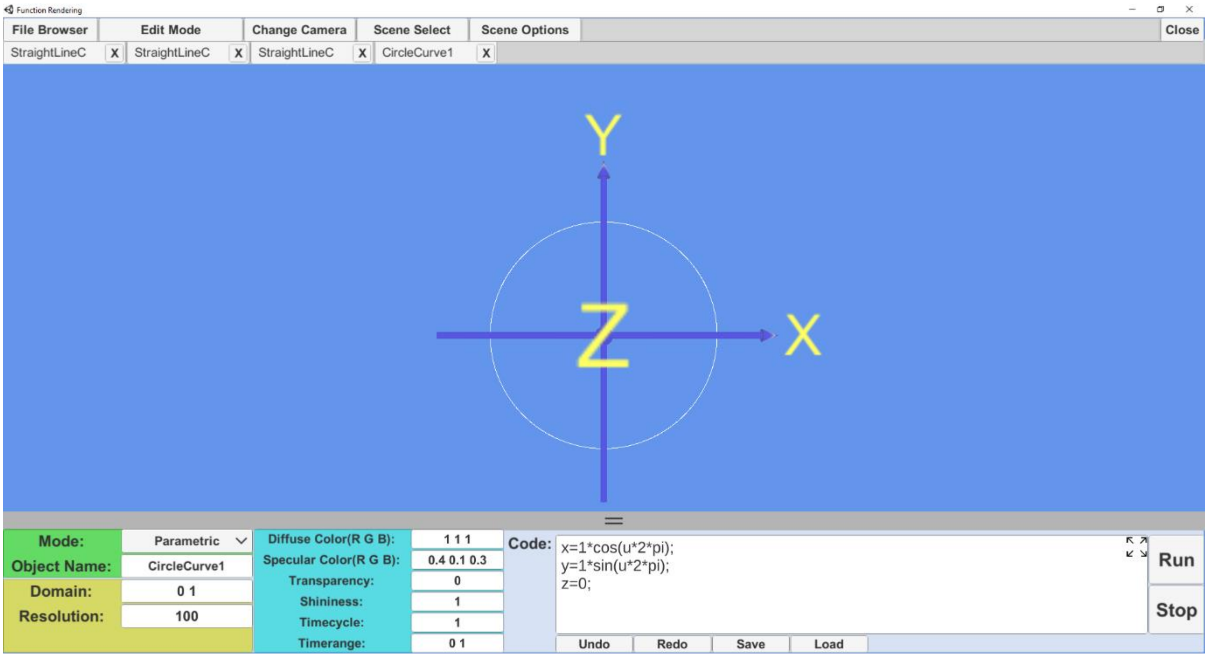
Curve 1	In StraightLineCurve1.Func,
	x = u;
	y = u;
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 100.

Curve 2	In StraightLineCurve2.Func,
	x = u;
	y = u;
	z = 0;
	
	The u parameter domain is [0 5].
	The sampling resolution is 100.

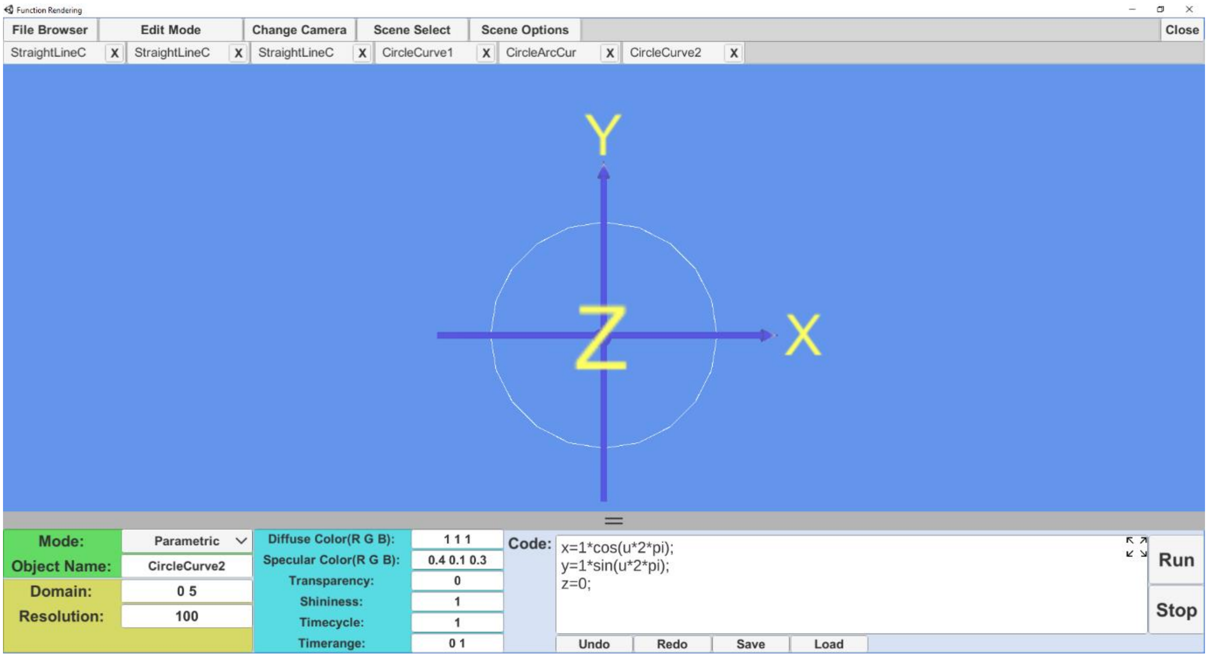
Curve 3	In StraightLineCurve3.Func,
	x = u;
	y = u;
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 2.

As x = u, y = u, increase in parameter domain will result in a longer line being drawn. The change of resolution will not affect the output and the resolution can even go as low as 1 as only one straight line is needed to create a straight line.

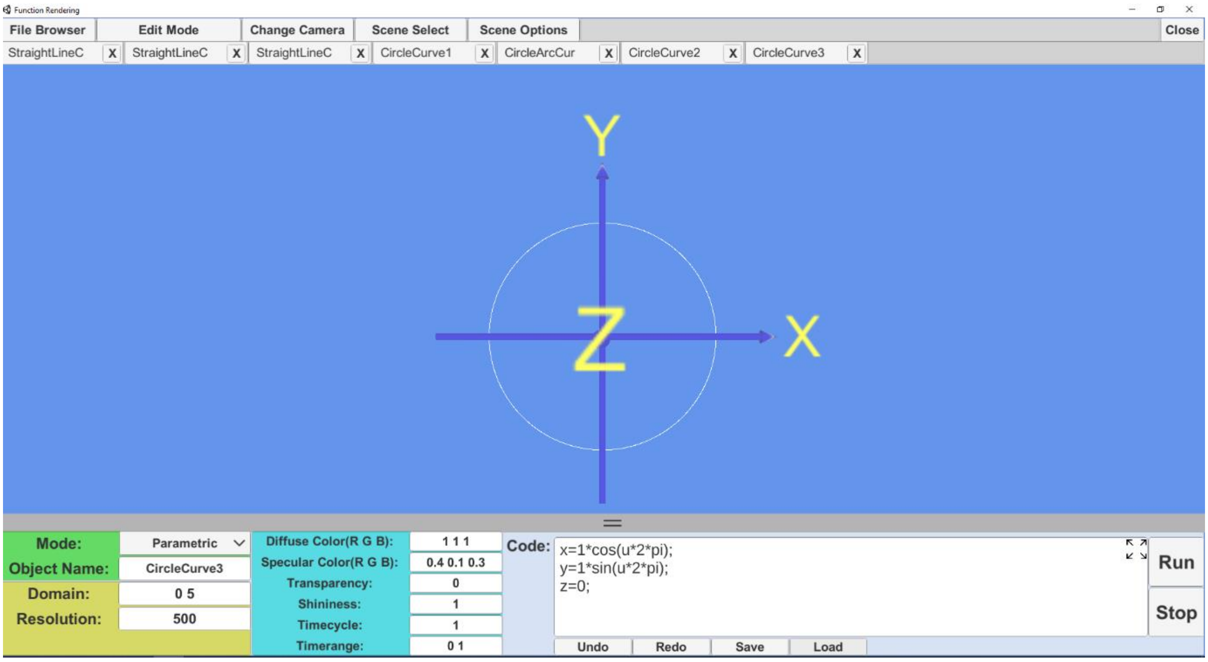
Circle



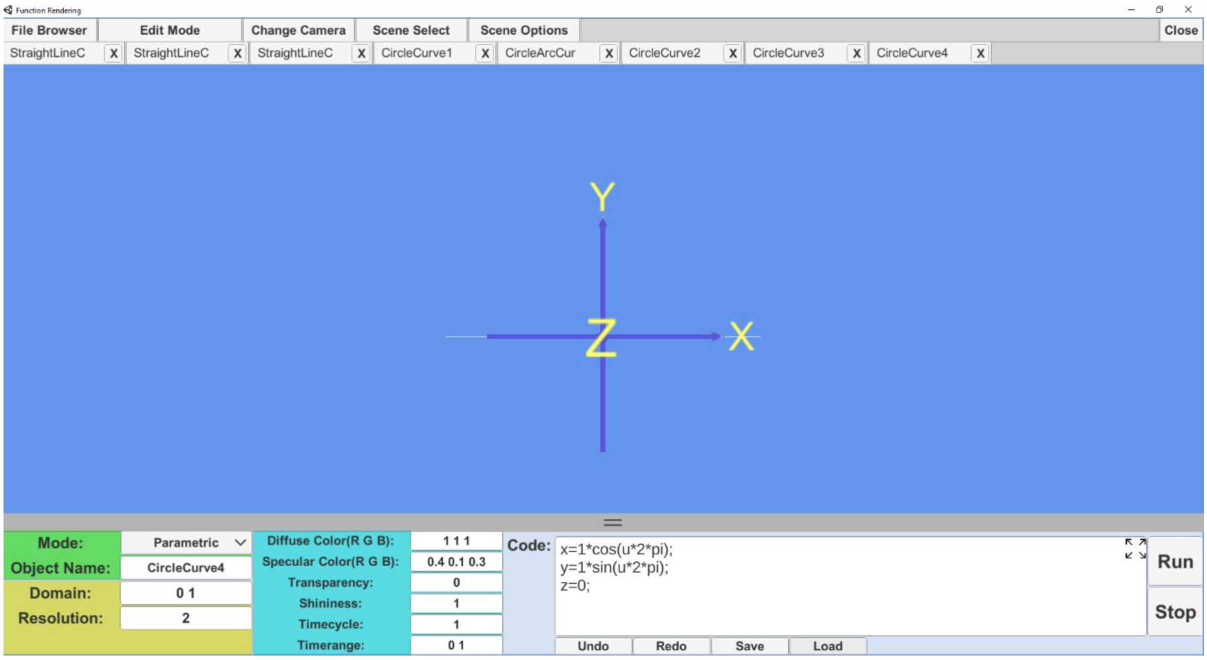
Curve 1



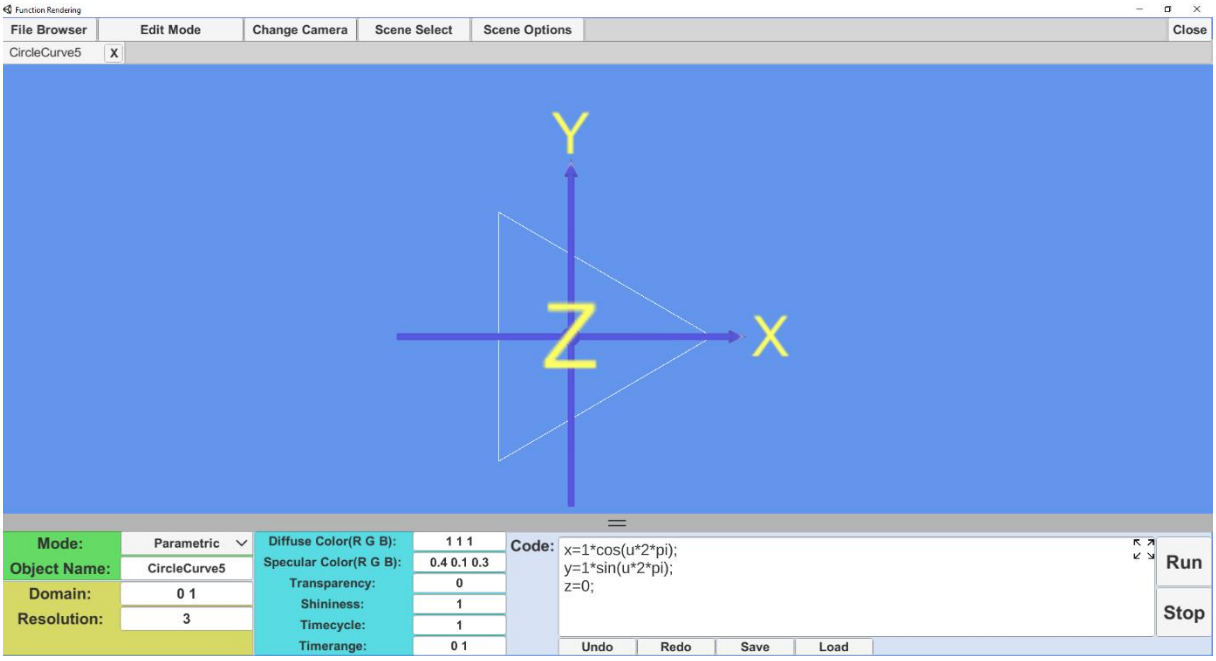
Curve 2



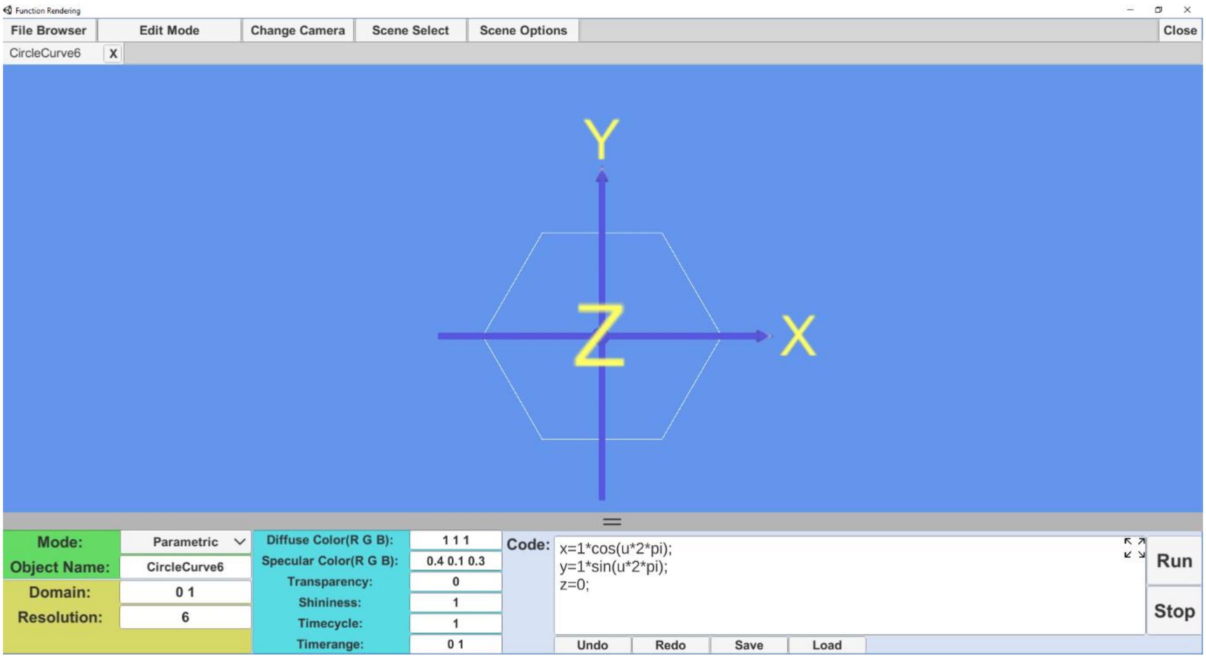
Curve 3



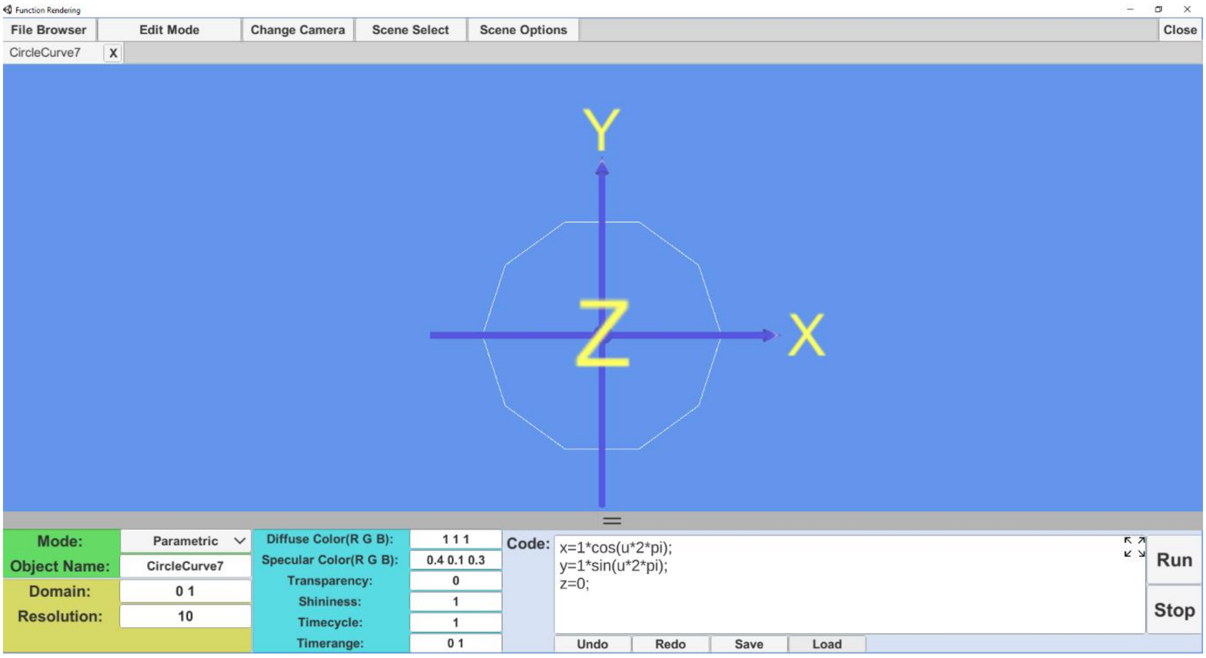
Curve 4



Curve 5



Curve 6



Curve 7

Curve No.	Notes

Curve 1	In CircleCurve1.Func,
	x = 1*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 100.

Curve 2	In CircleCurve2.Func,
	x = 1*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 5].
	The sampling resolution is 100.

Curve 3	In CircleCurve3.Func,
	x = 1*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 5].
	The sampling resolution is 500.

Curve 4	In CircleCurve4.Func,
	x = 1*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;

	The u parameter domain is [0 1]. The sampling resolution is 2.

Curve 5	In CircleCurve5.Func,
	x = 1*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 3.

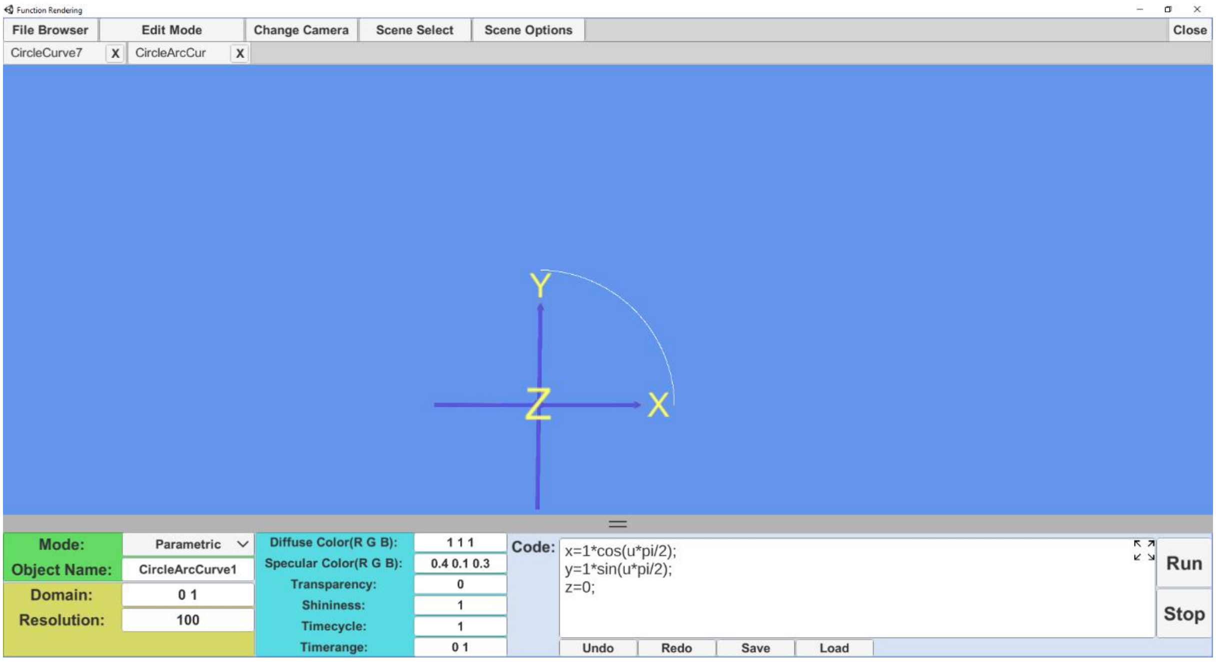
Curve 6	In CircleCurve6.Func,
	x = 1*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 6.

Curve 7	In CircleCurve7.Func,
	x = 1*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 10.

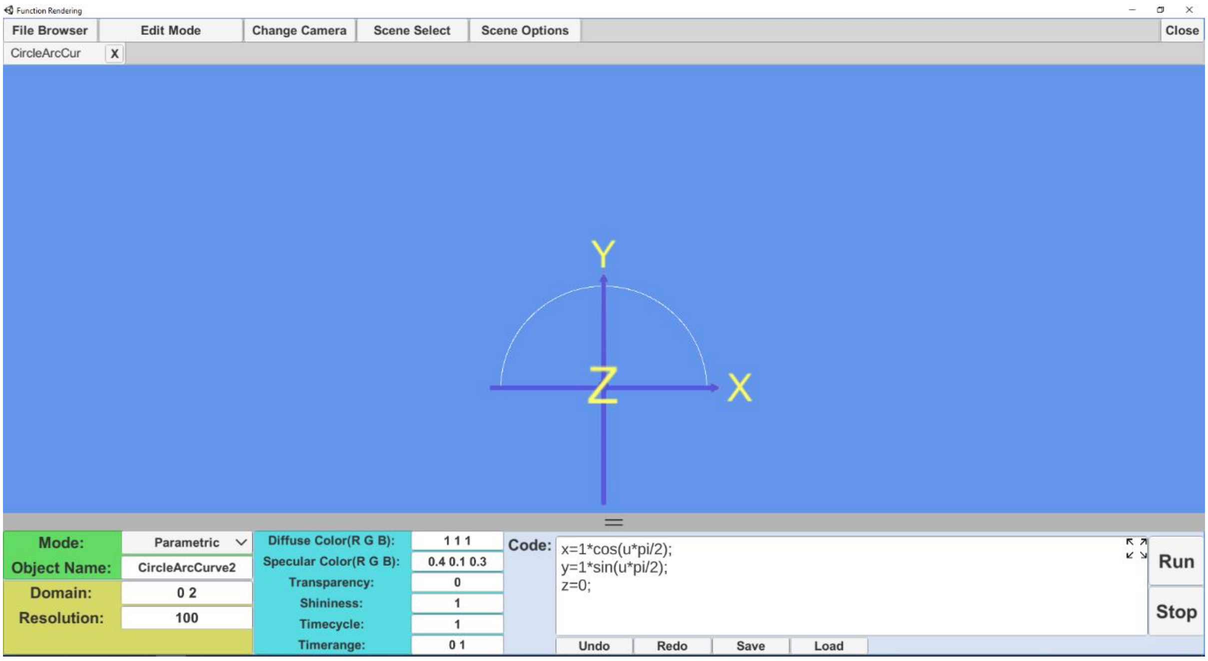
A circle is formed by joining multiple lines together around the point of origin. When the parameter domain increases, this causes imperfect circle as higher resolutions are needed. As the parameter domain increases by 5 times, the resolution therefore increases by 5 times to 500 to achieve a smooth circle.

When the resolution is 2, nothing is being drawn as to draw around the point of origin, at least 3 lines are needed. Therefore, resolution of 3 produces a triangle. In conclusion, as the resolution increases, the circle becomes smoother.

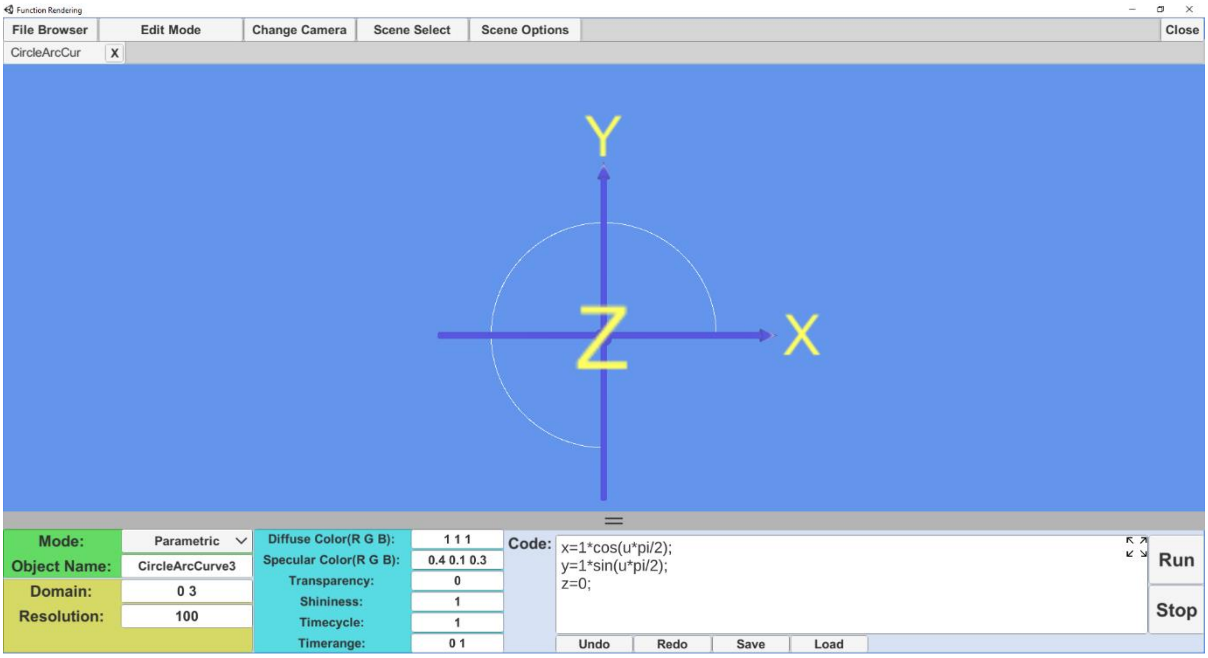
Arc of Circle



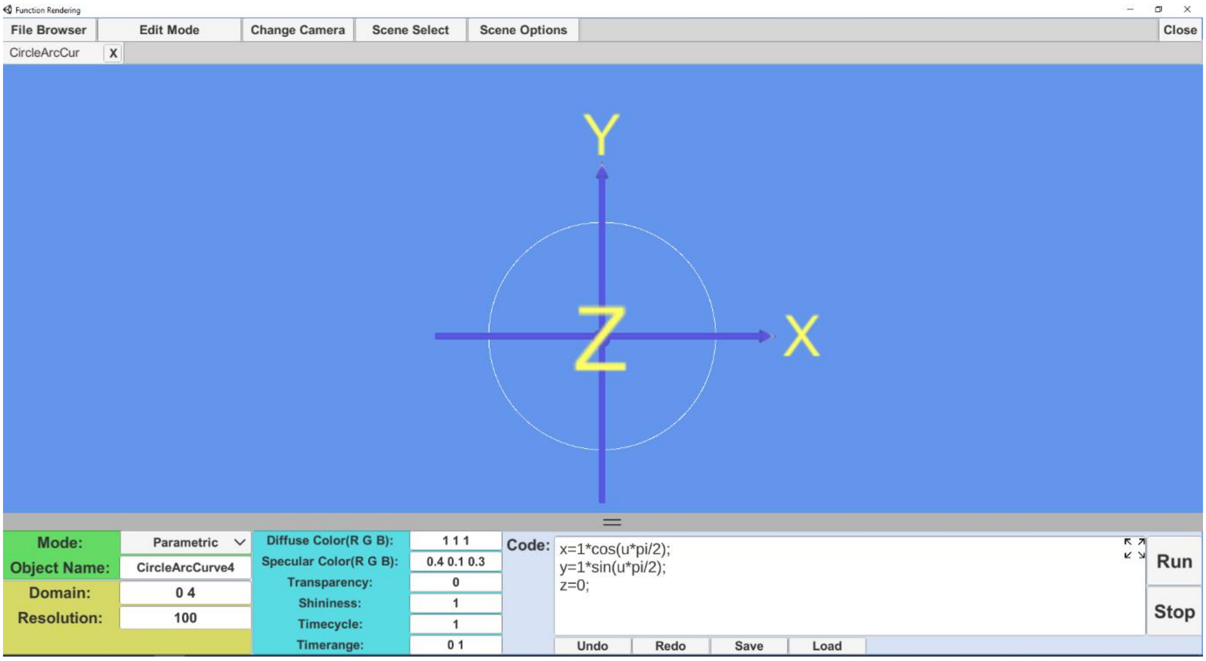
Curve 1



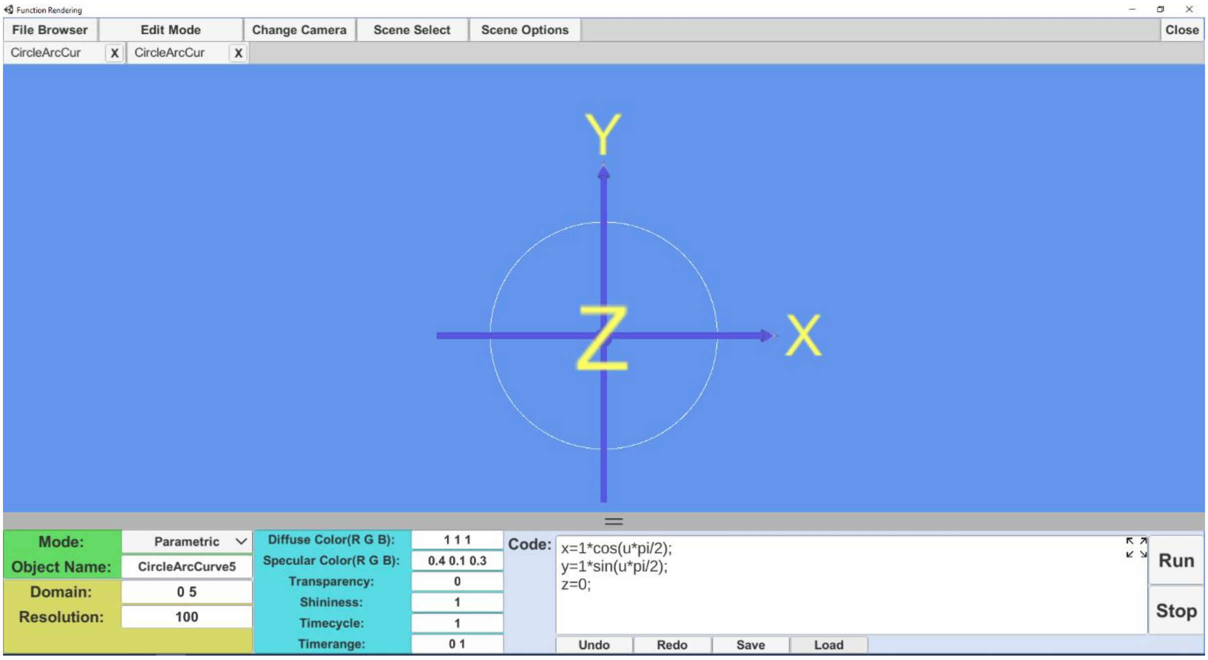
Curve 2



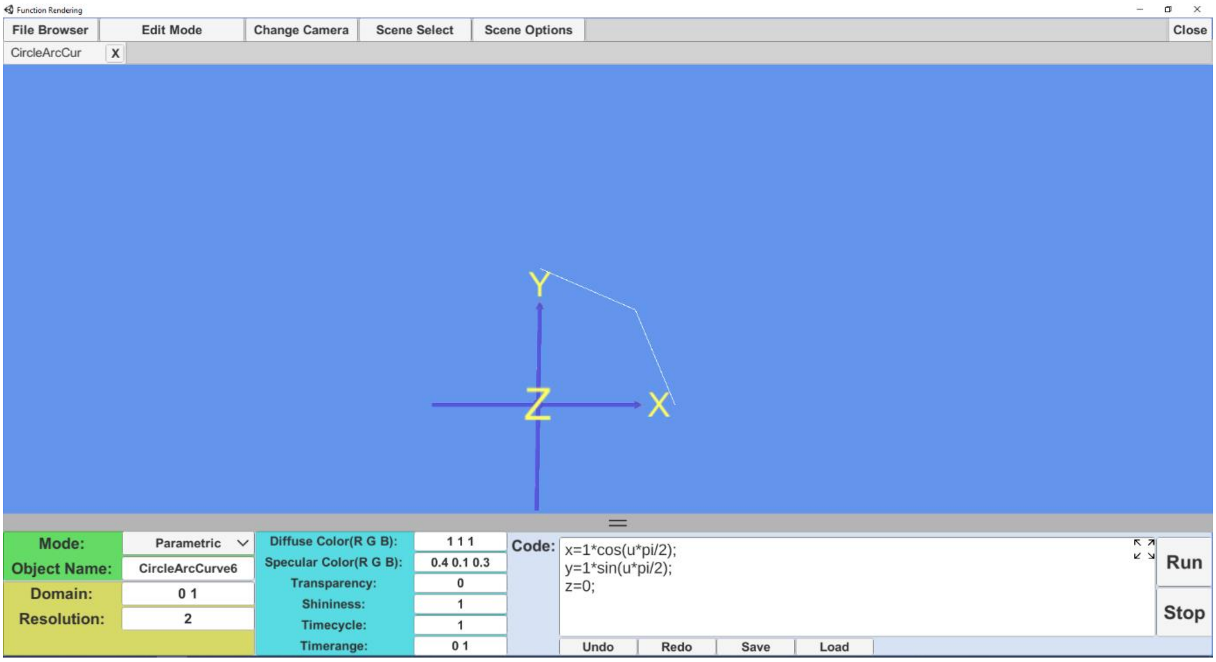
Curve 3



Curve 4



Curve 5



Curve 6

Curve No.	**Notes**

Curve 1	In CircleArcCurve1.Func,
	x = 1*cos(u*pi/2);
	y = 1*sin(u*pi/2);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 100.

Curve 2	In CircleArcCurve2.Func,
	x = 1*cos(u*pi/2);
	y = 1*sin(u*pi/2);
	z = 0;
	
	The u parameter domain is [0 2].
	The sampling resolution is 100.

Curve 3	In CircleArcCurve3.Func,
	x = 1*cos(u*pi/2);
	y = 1*sin(u*pi/2);
	z = 0;
	
	The u parameter domain is [0 3].
	The sampling resolution is 100.

Curve 4	In CircleArcCurve4.Func,
	x = 1*cos(u*pi/2);
	y = 1*sin(u*pi/2);
	z = 0;
	
	The u parameter domain is [0 4].
	The sampling resolution is 100.

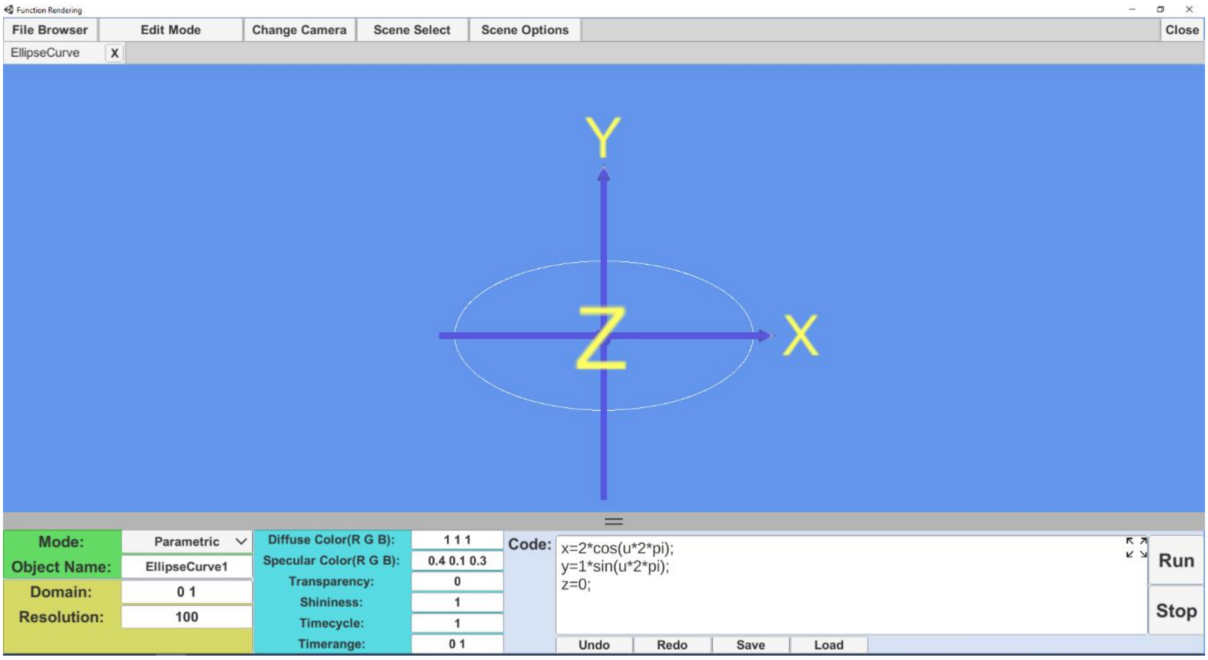
Curve 5	In CircleArcCurve5.Func,
	x = 1*cos(u*pi/2);
	y = 1*sin(u*pi/2);
	z = 0;
	
	The u parameter domain is [0 5].
	The sampling resolution is 100.

Curve 6	In CircleArcCurve6.Func,
	x = 1*cos(u*pi/2);
	y = 1*sin(u*pi/2);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 2.

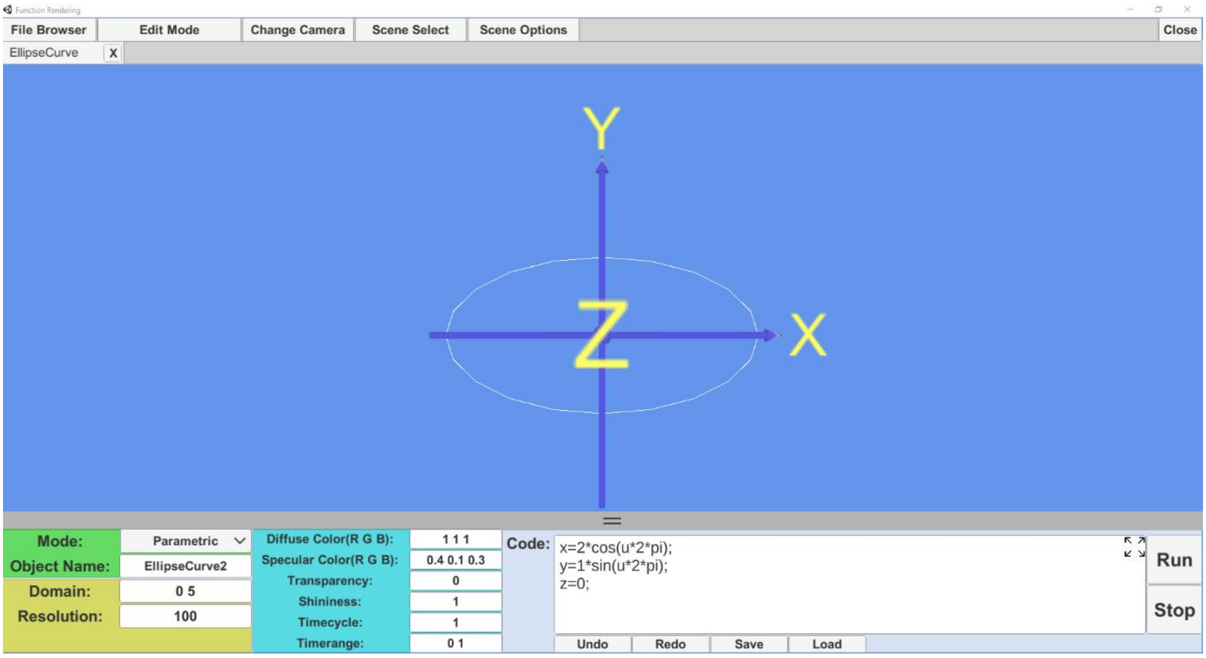
When the resolution remains at 100, and the parameter domain is 0 to 1, the line is drawn from the x intercept to the y intercept. However, when the parameter domain changes, the arc length changes directly proportional to it. Hence when the domain is 0 to 4, the arc length increased and causing a circle to be formed.

In curve 6, the parameter domain remains the same but the sampling resolution is changed to 2. When the sampling resolution is 2, only 2 lines are drawn to form the arc. However, an imperfect arc is drawn. Similar to the circle, higher sampling resolutions are needed to draw more lines to form a perfect circle.

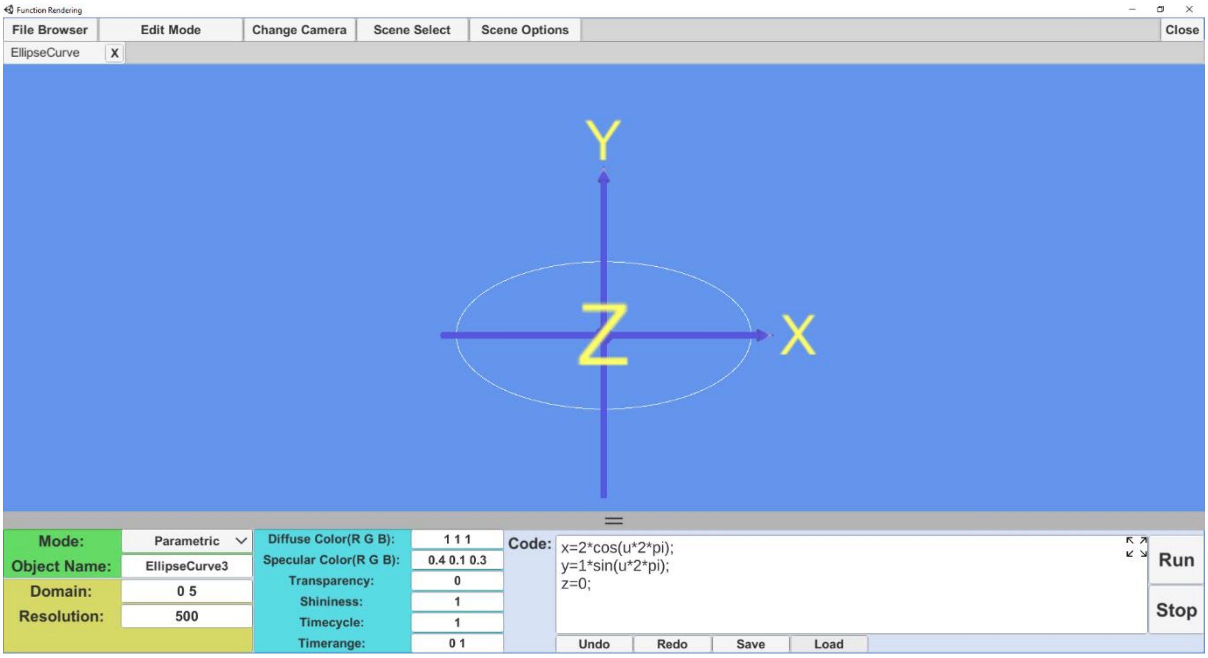
Ellipse



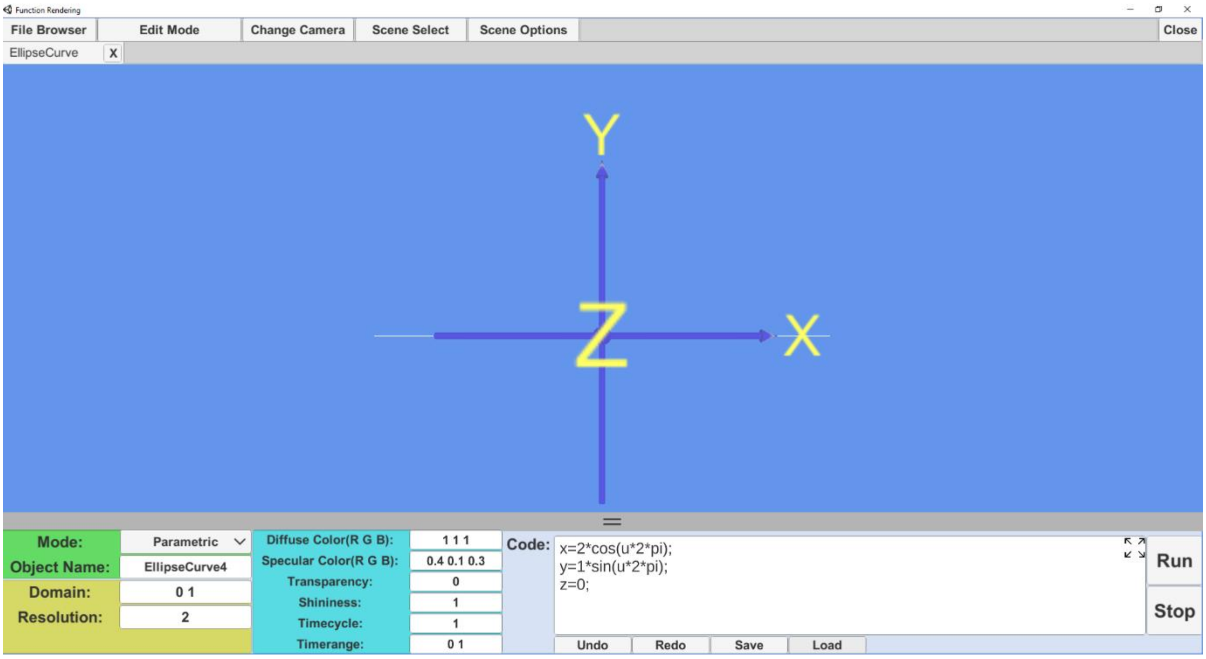
Curve 1



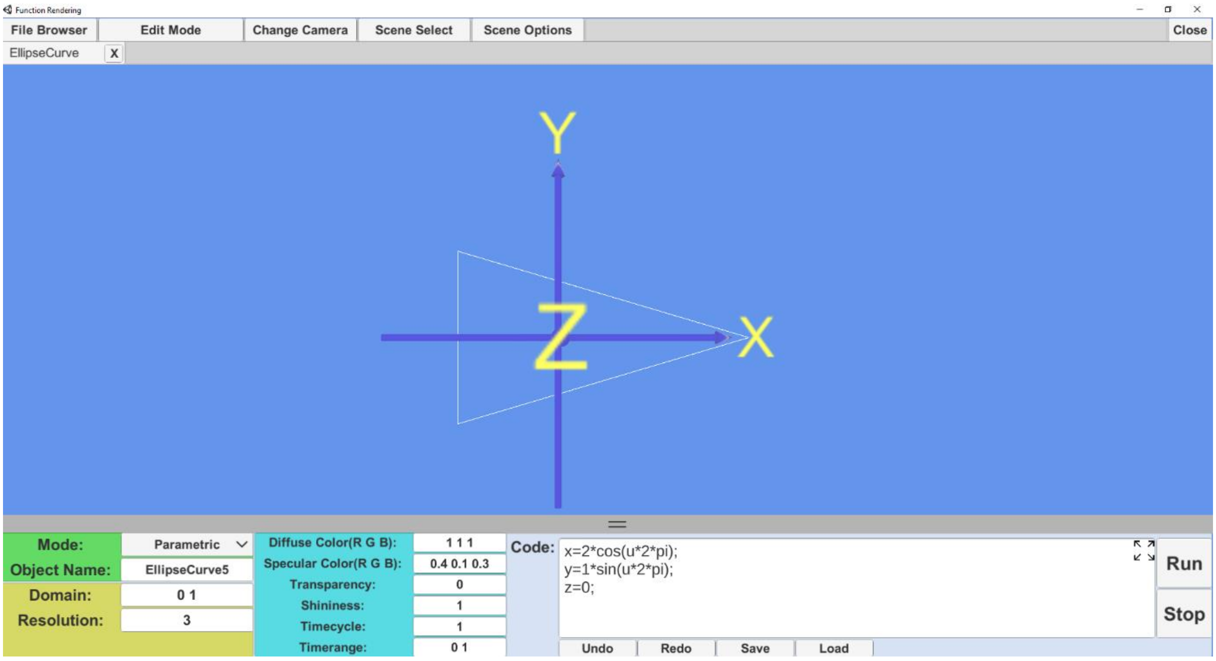
Curve 2



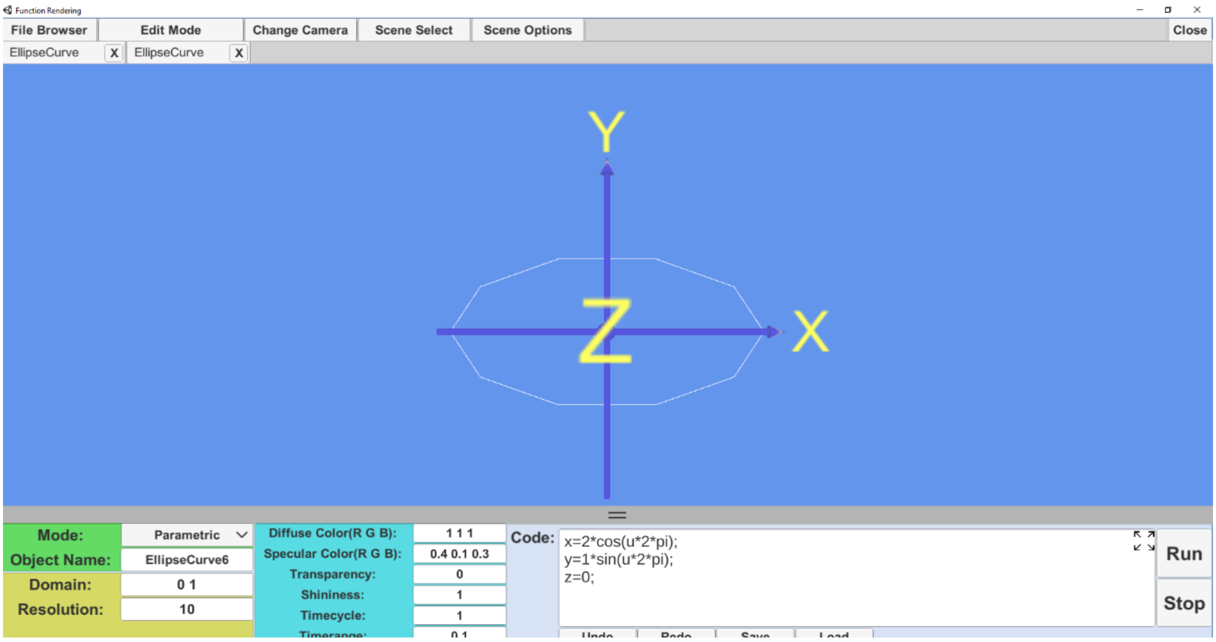
Curve 3



Curve 4



Curve 5



Curve 6

Curve No.	**Notes**

Curve 1	In EllipseCurve1.Func,
	x = 2*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 100.

Curve 2	In EllipseCurve2.Func, x = 2*cos(u*2*pi);

	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 5].
	The sampling resolution is 100.

Curve 3	In EllipseCurve3.Func,
	x = 2*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 5].
	The sampling resolution is 500.

Curve 4	In EllipseCurve4.Func,
	x = 2*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 2.

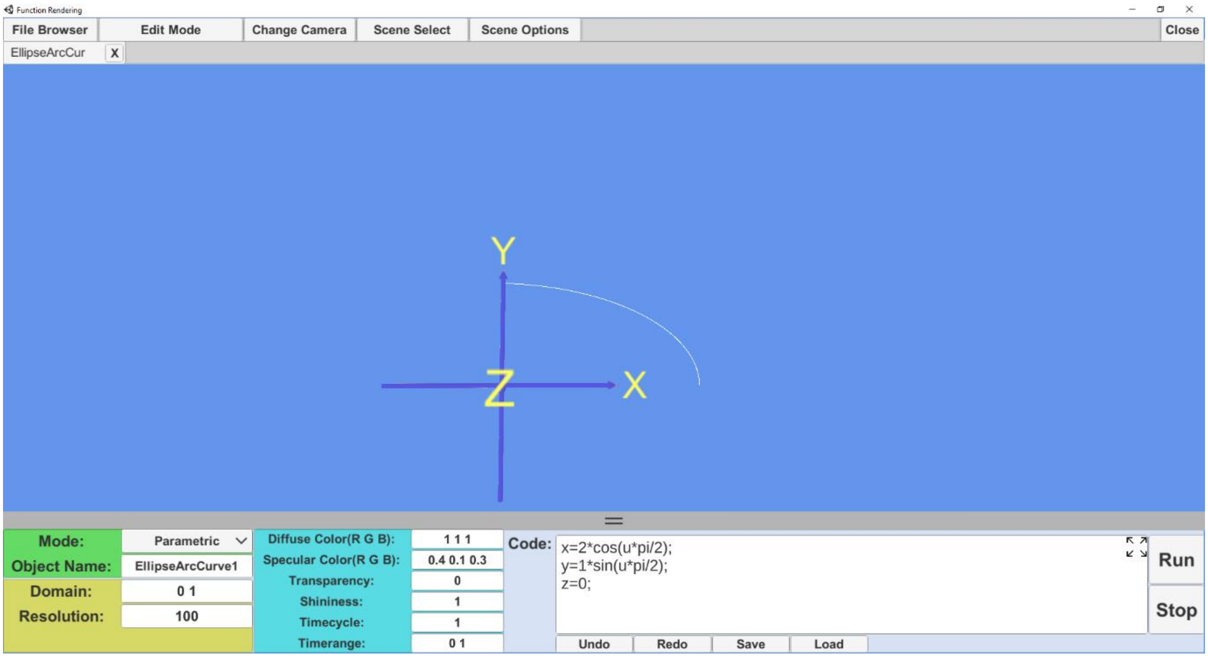
Curve 5	In EllipseCurve5.Func,
	x = 2*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 3.

Curve 6	In EllipseCurve6.Func,
	x = 2*cos(u*2*pi);
	y = 1*sin(u*2*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 10.

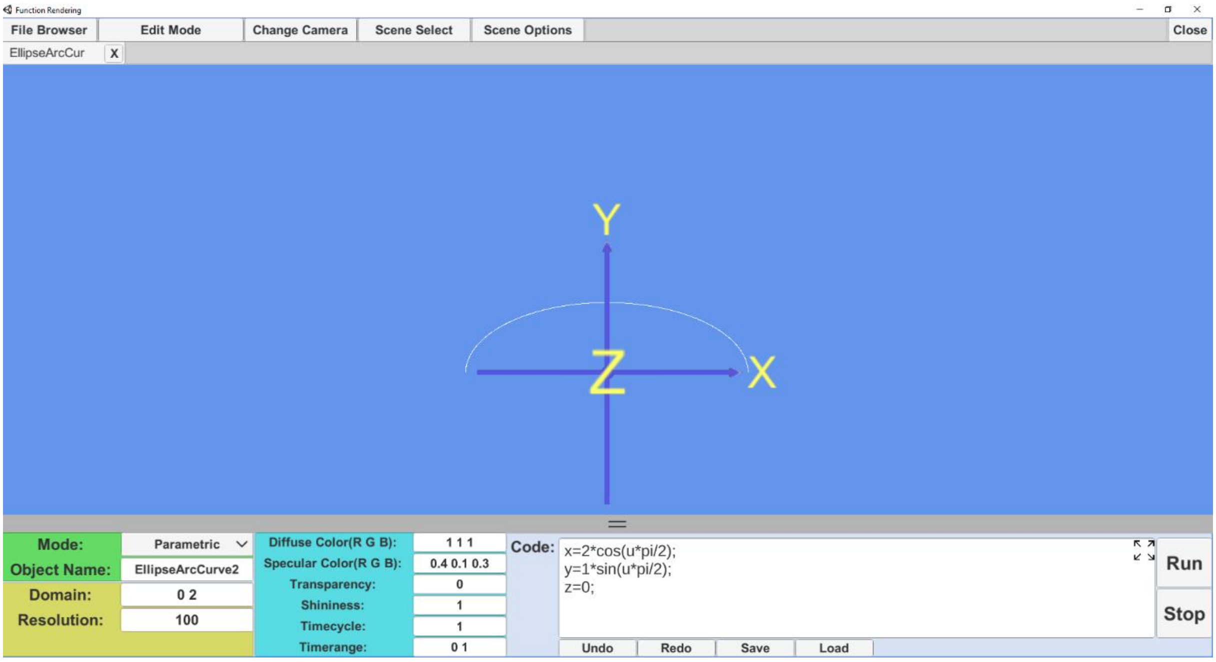
Similar to circle, as the parameter domain increases, the ellipse becomes less smooth as more line are needed to be drawn to create a smooth ellipse. This is due to the fact that as the parameter domain increases, the arc length increases, causing more lines needed to be drawn for a smooth ellipse.

As the sampling resolution decreases to 2, a straight line is being drawn. Minimum sample resolution of 3 is needed to draw around the point of origin in curve 5. In curve 6, the sampling resolution is 10. The result shown is closer to an ellipse. Therefore as the sampling resolution gets higher, the smoother the curve.

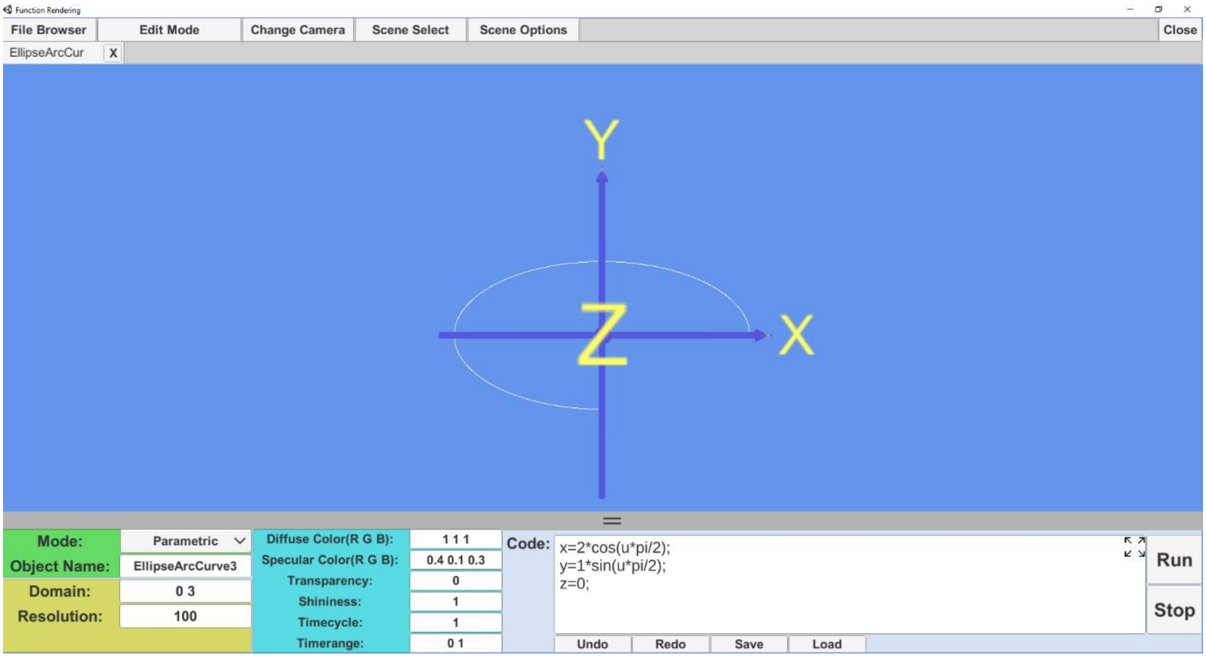
Arc of Ellipse



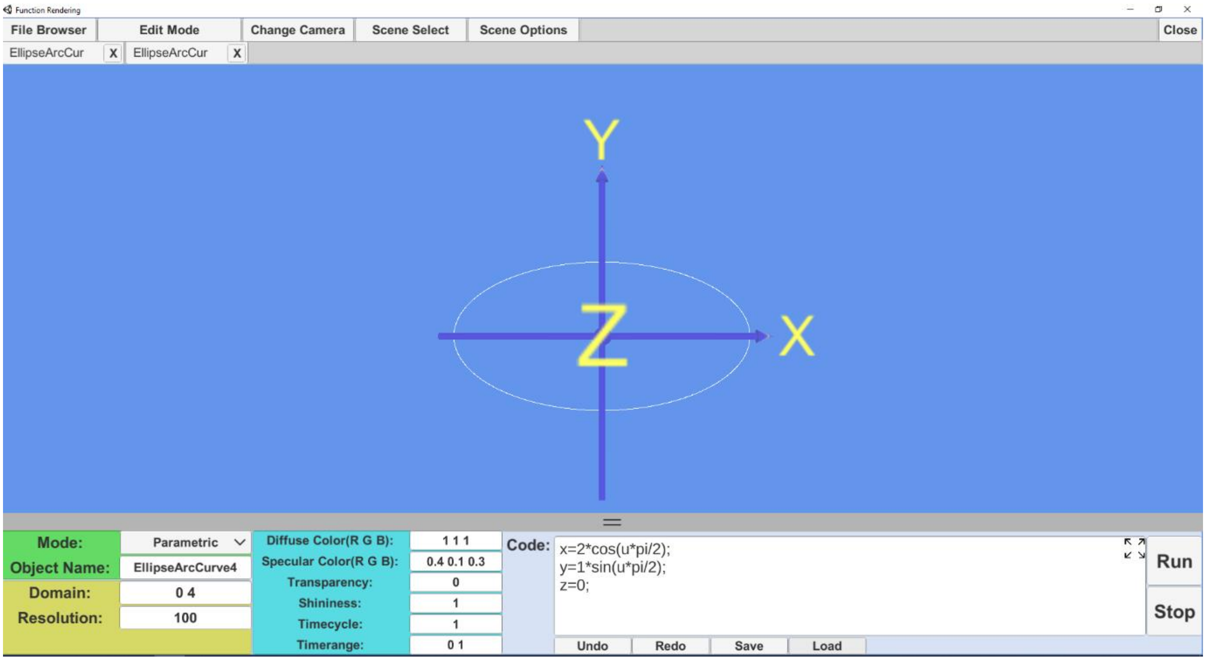
Curve 1



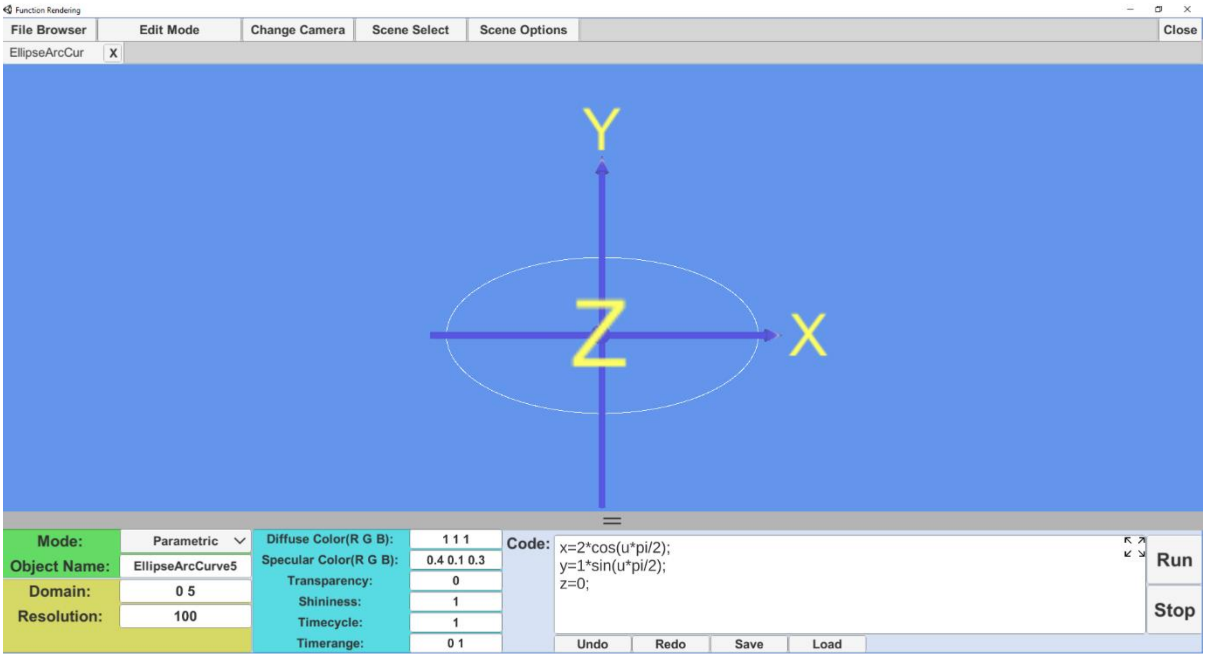
Curve 2



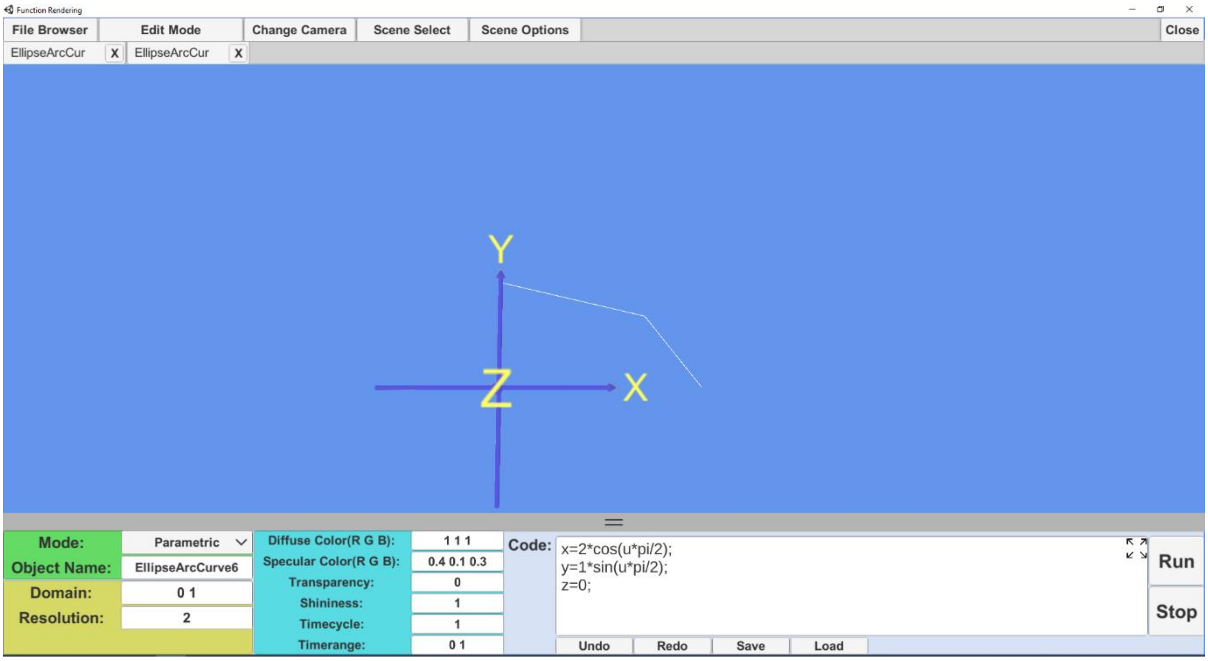
Curve 3



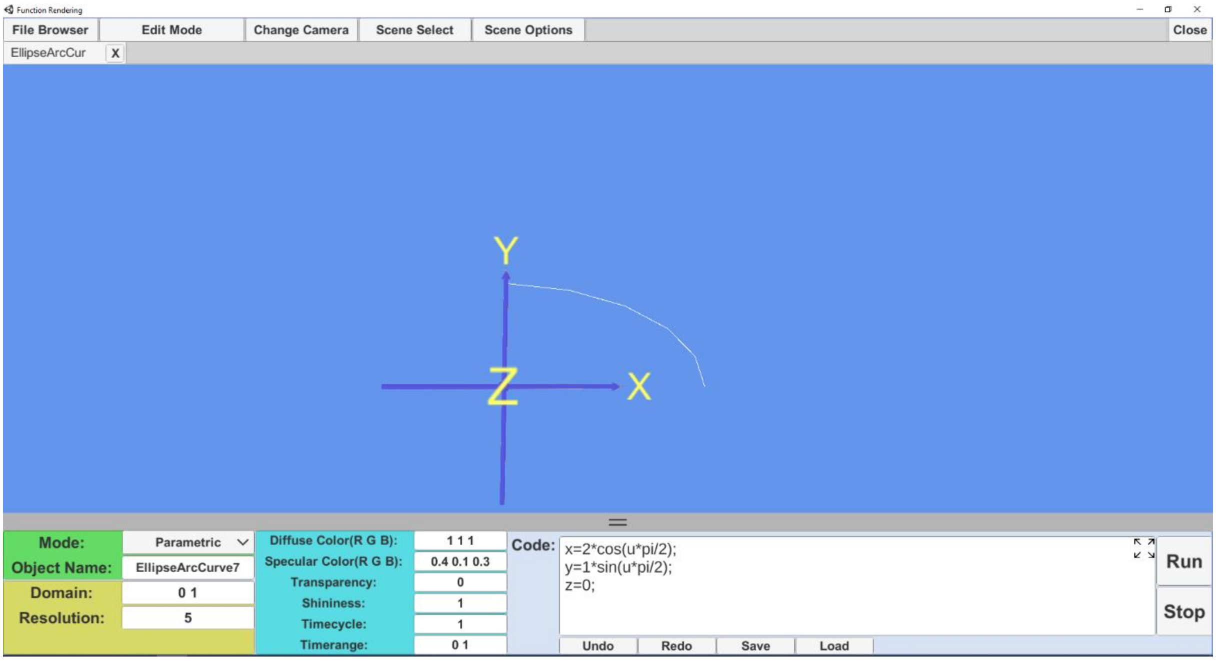
Curve 4



Curve 5



Curve 6



Curve 7

Curve No.	Notes

Curve 1	In EllipseArcCurve1.Func,
	x = 2*cos(u*pi/2);
	y = 1*sin(u* pi/2);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 100.

Curve 2	In EllipseArcCurve2.Func,
	x = 2*cos(u*pi/2);
	y = 1*sin(u* pi/2);
	z = 0;
	
	The u parameter domain is [0 2].
	The sampling resolution is 100.

Curve 3	In EllipseArcCurve3.Func,
	x = 2*cos(u*pi/2);
	y = 1*sin(u* pi/2);
	z = 0;
	
	The u parameter domain is [0 3].
	The sampling resolution is 100.

Curve 4	In EllipseArcCurve4.Func,
	x = 2*cos(u*pi/2);
	y = 1*sin(u* pi/2);
	z = 0;

	The u parameter domain is [0 4]. The sampling resolution is 100.

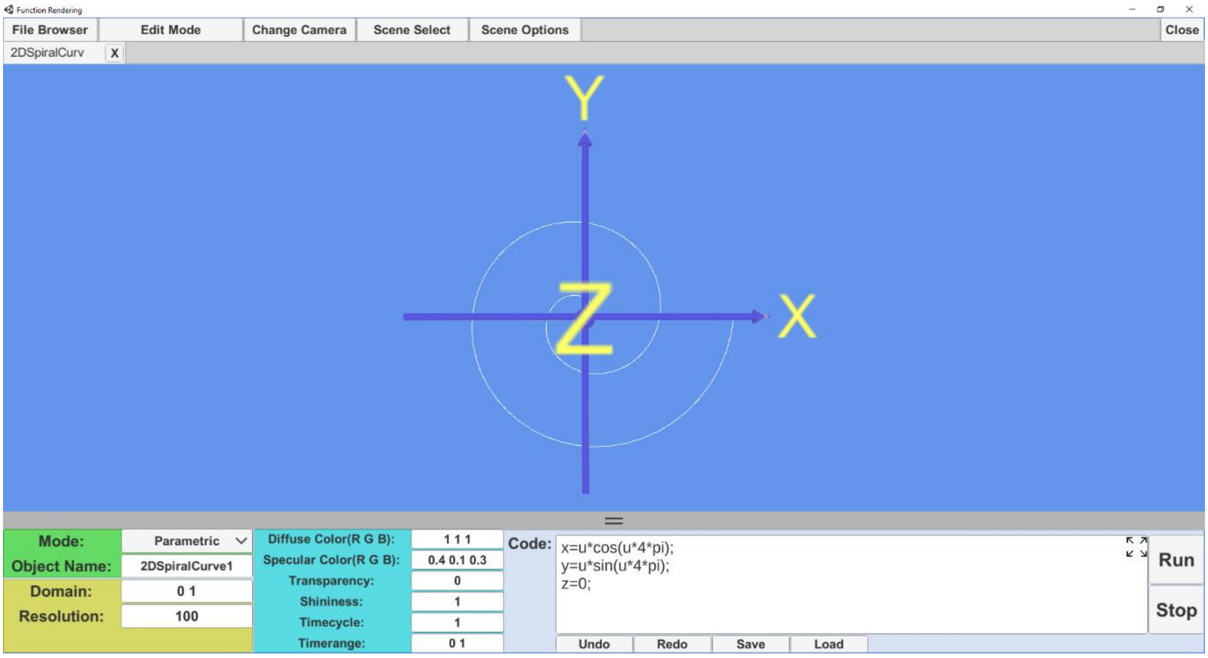
Curve 5	In EllipseArcCurve5.Func,
	x = 2*cos(u*pi/2);
	y = 1*sin(u* pi/2);
	z = 0;
	
	The u parameter domain is [0 5].
	The sampling resolution is 100.

Curve 6	In EllipseArcCurve6.Func,
	x = 2*cos(u*pi/2);
	y = 1*sin(u* pi/2);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 2.

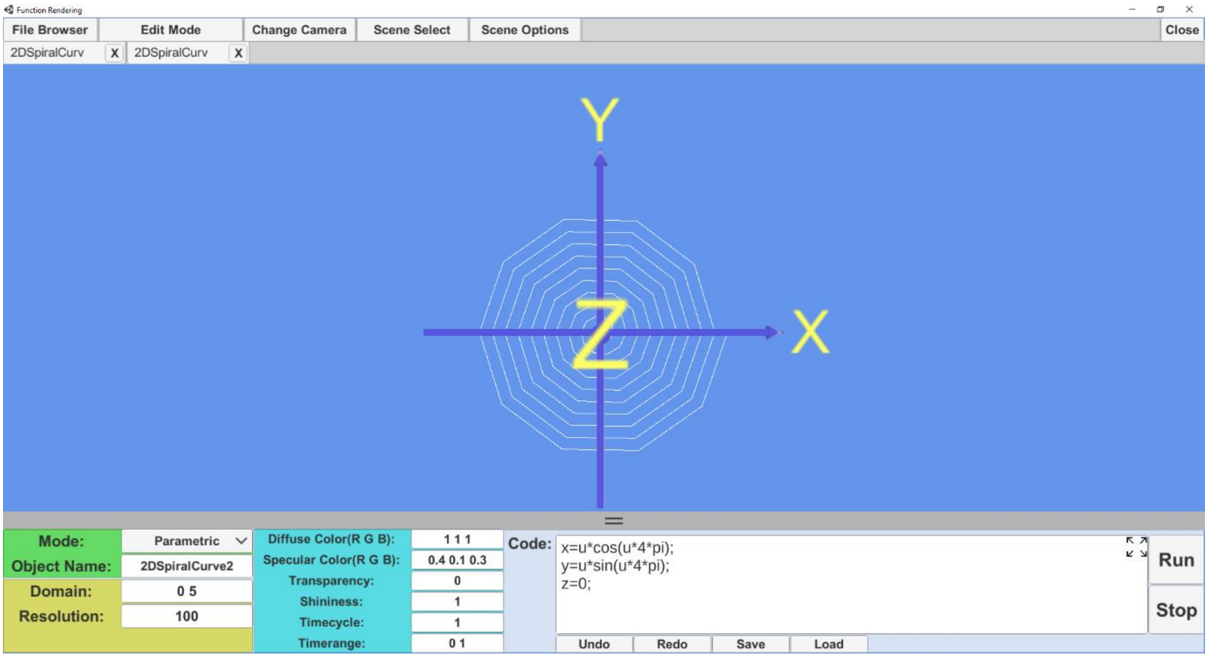
Curve 7	In EllipseArcCurve7.Func,
	x = 2*cos(u*pi/2);
	y = 1*sin(u* pi/2);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 5.

Similar to arc of circle, as the domain increases, its arc length increases. When the domain reaches from 0 to minimum of 4, an ellipse is formed. When the domain remains 0 1 while the sampling resolution is 2, 2 lines were drawn. For curve 7, the sampling resolution is at 5, the result of the curve drawn is closer to a smooth shape of the arc of ellipse. Therefore, the higher the sampling resolution, the smoother the ellipse as more lines were used to form the ellipse.

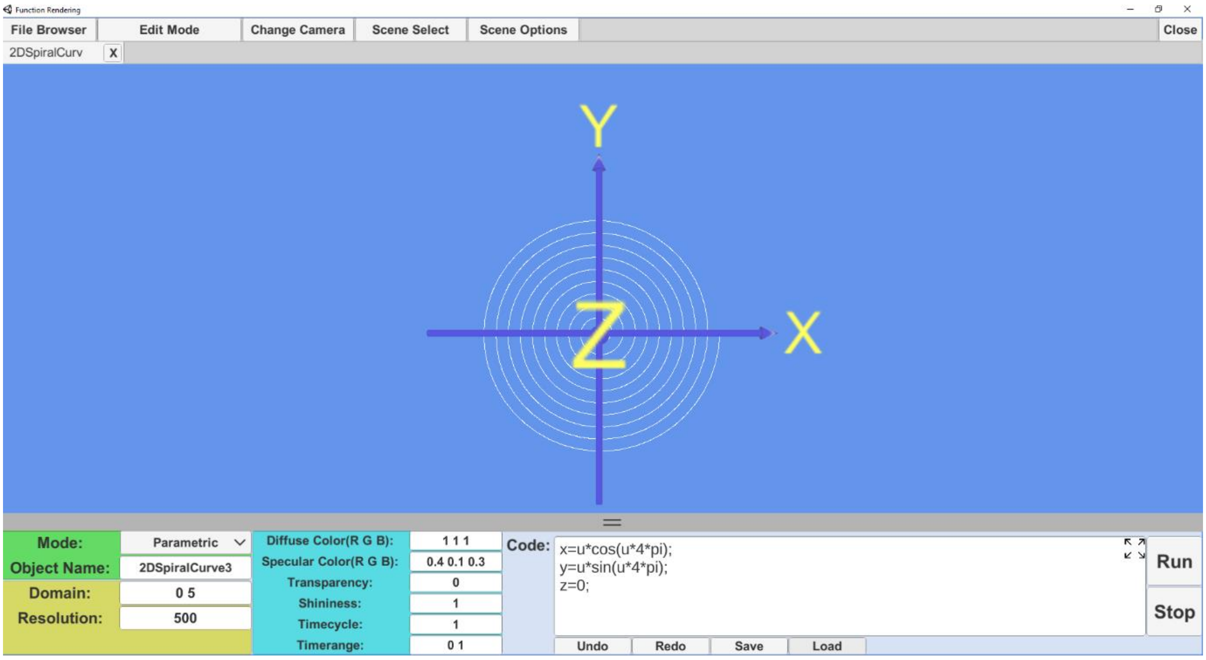
2D Spiral



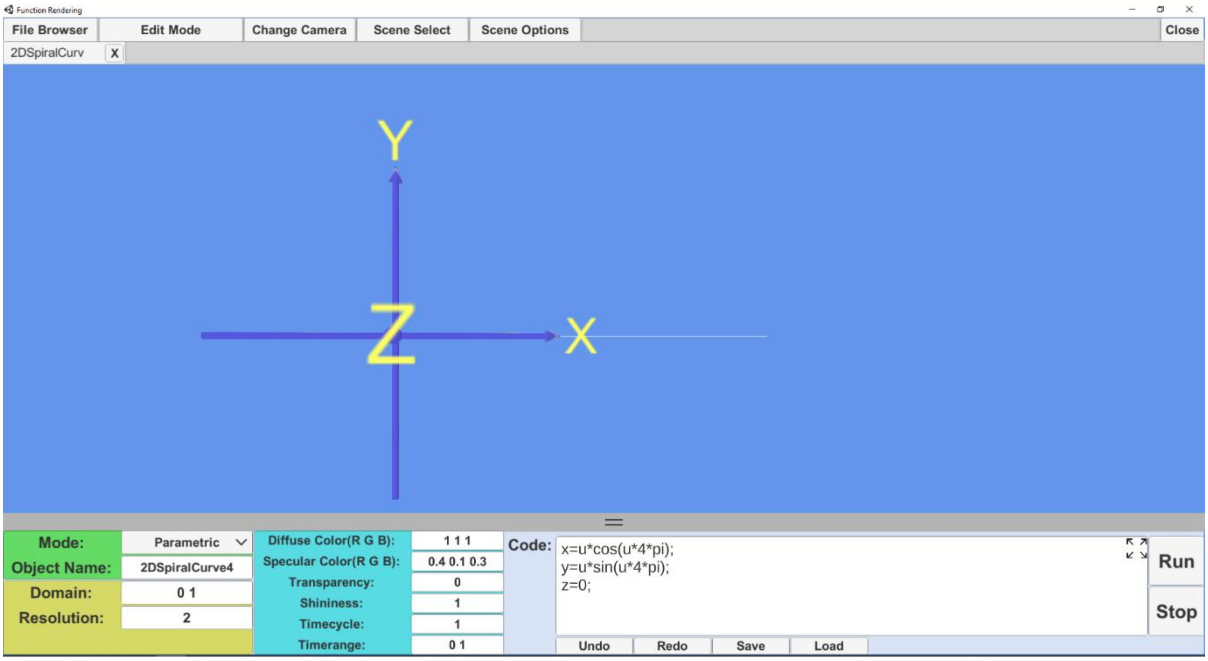
Curve 1



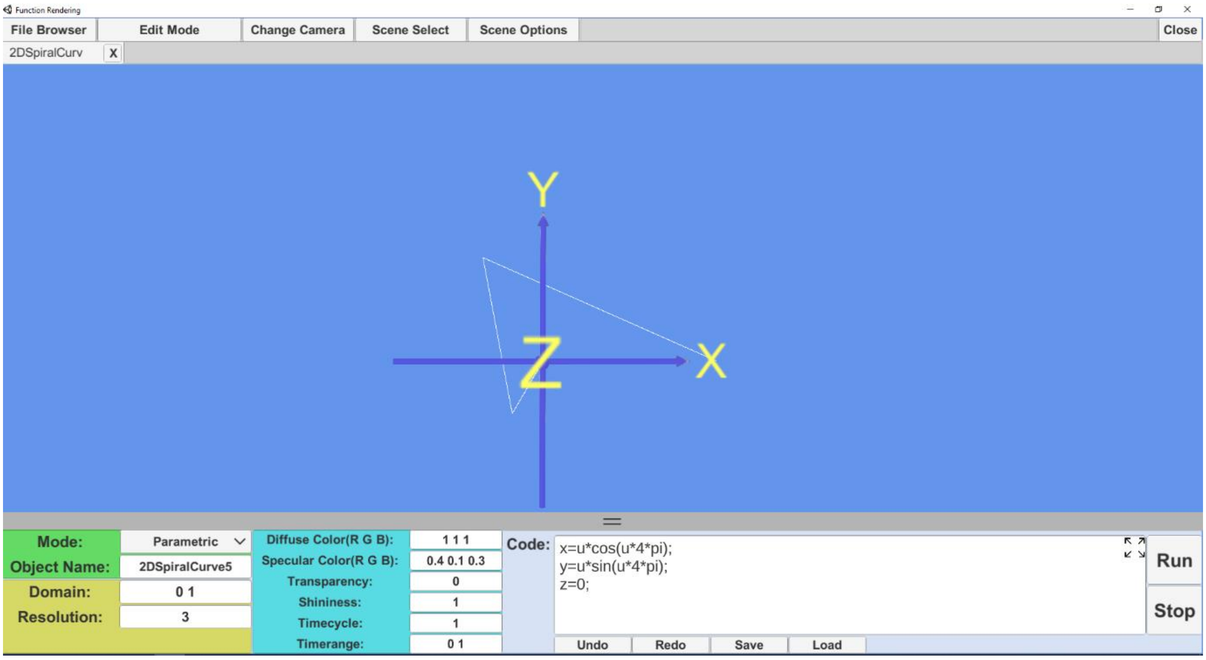
Curve 2



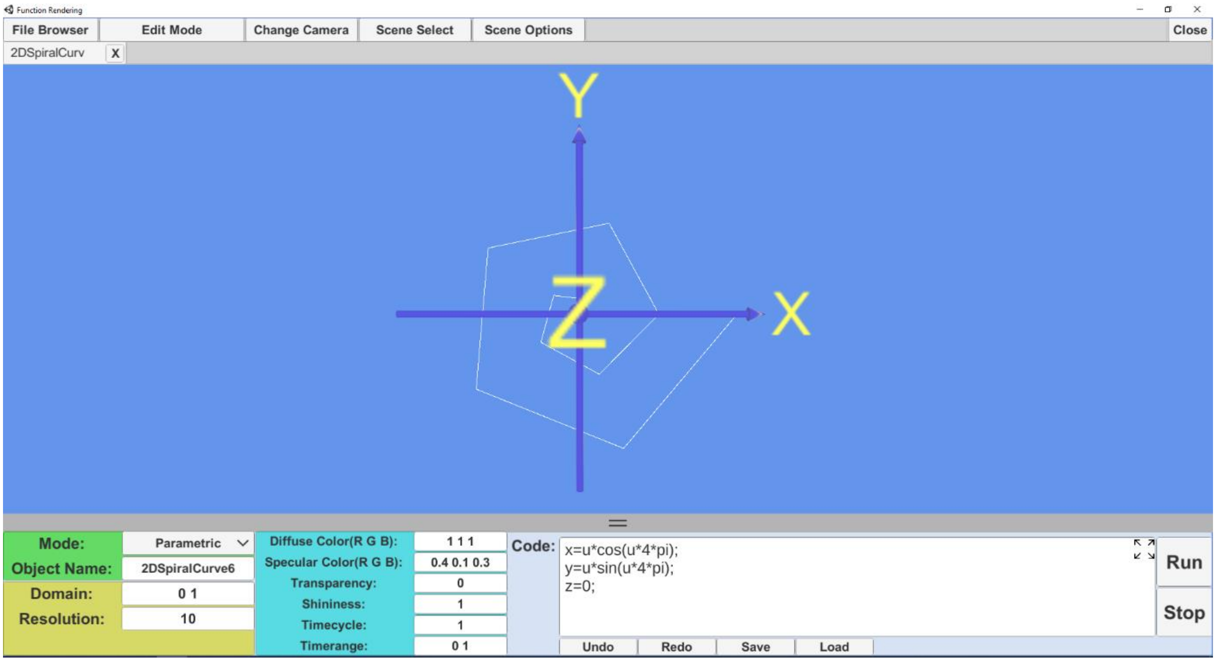
Curve 3



Curve 4



Curve 5



Curve 6

Curve No.	**Notes**

Curve 1	In 2DSpiralCurve1.Func,
	x = u*cos(u*4*pi);
	y = u*sin(u*4*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 100.

Curve 2	In 2DSpiralCurve2.Func, x = u*cos(u*4*pi);

	y = u*sin(u*4*pi);
	z = 0;
	
	The u parameter domain is [0 5].
	The sampling resolution is 100.

Curve 3	In 2DSpiralCurve3.Func,
	x = u*cos(u*4*pi);
	y = u*sin(u*4*pi);
	z = 0;
	
	The u parameter domain is [0 5].
	The sampling resolution is 500.

Curve 4	In 2DSpiralCurve4.Func,
	x = u*cos(u*4*pi);
	y = u*sin(u*4*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 2.

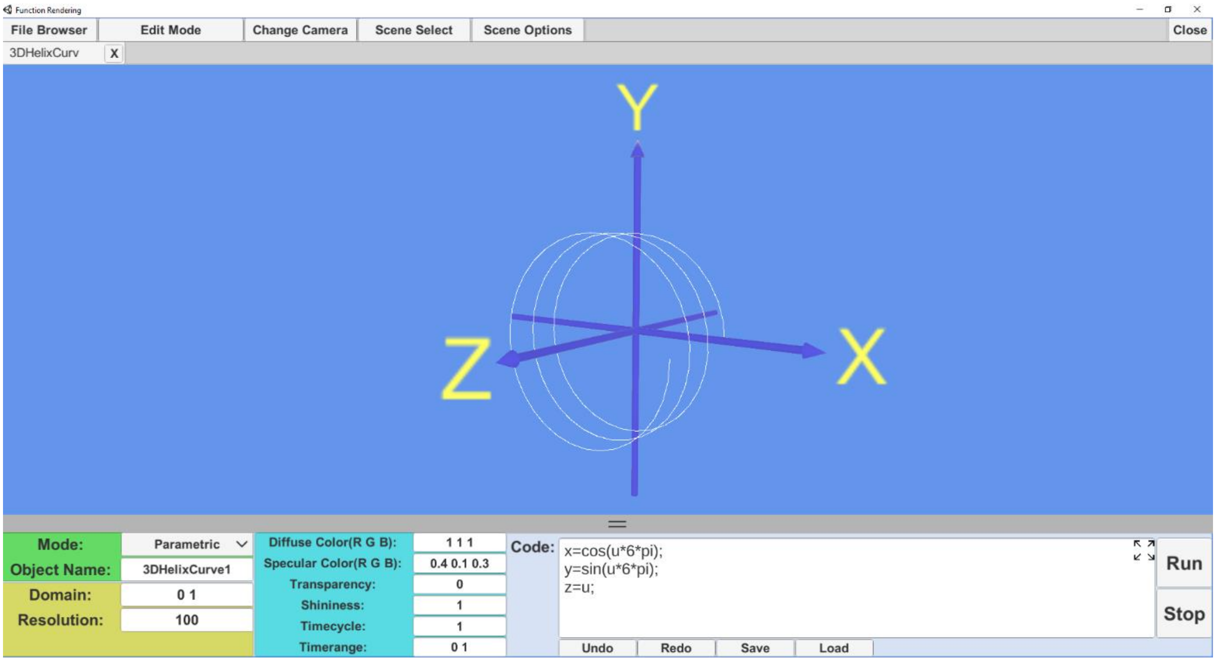
Curve 5	In 2DSpiralCurve5.Func,
	x = u*cos(u*4*pi);
	y = u*sin(u*4*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 3.

Curve 6	In 2DSpiralCurve6.Func,
	x = u*cos(u*4*pi);
	y = u*sin(u*4*pi);
	z = 0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 10.

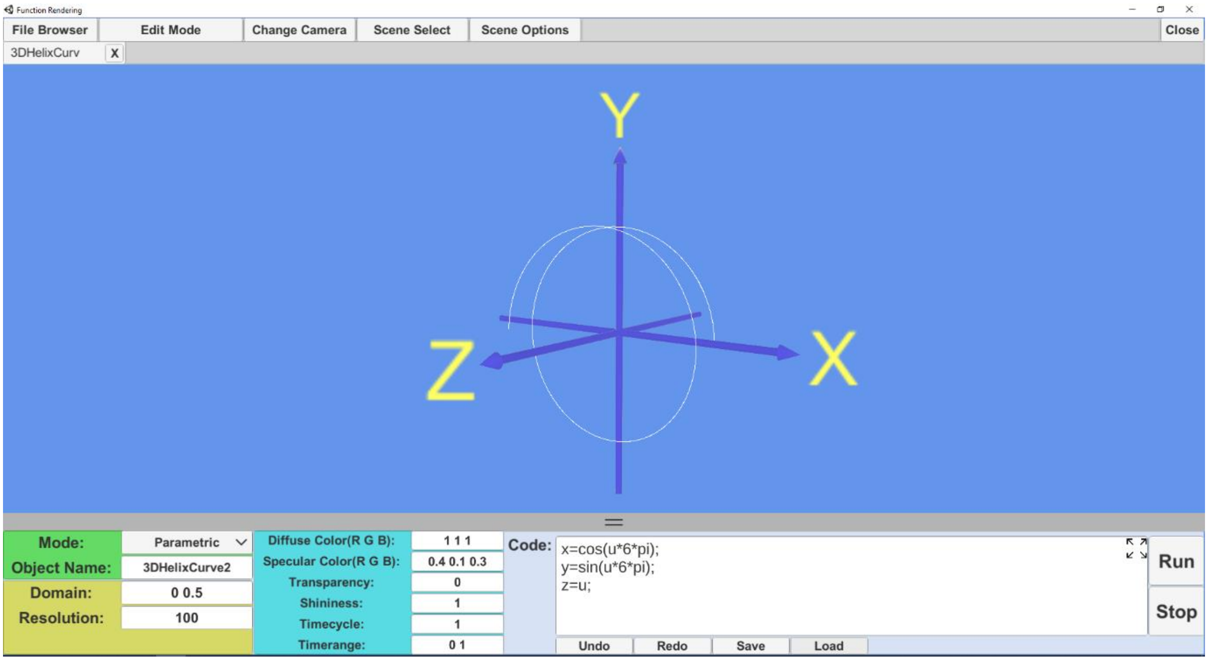
As the domain of the parameter increases, the number of spirals increases, so does the distance from the point of origin. This is because the parameter is used as the coefficient or constant of the Cartesian. Therefore, both the number of spirals and distance from the point of origin will increase or decrease direct proportionally.

Similar to circle and ellipse, more than 2 sampling resolutions are needed to draw a curve around the point of origin. As the sampling resolution increases, the curve that forms the 2D Spiral gets smoother.

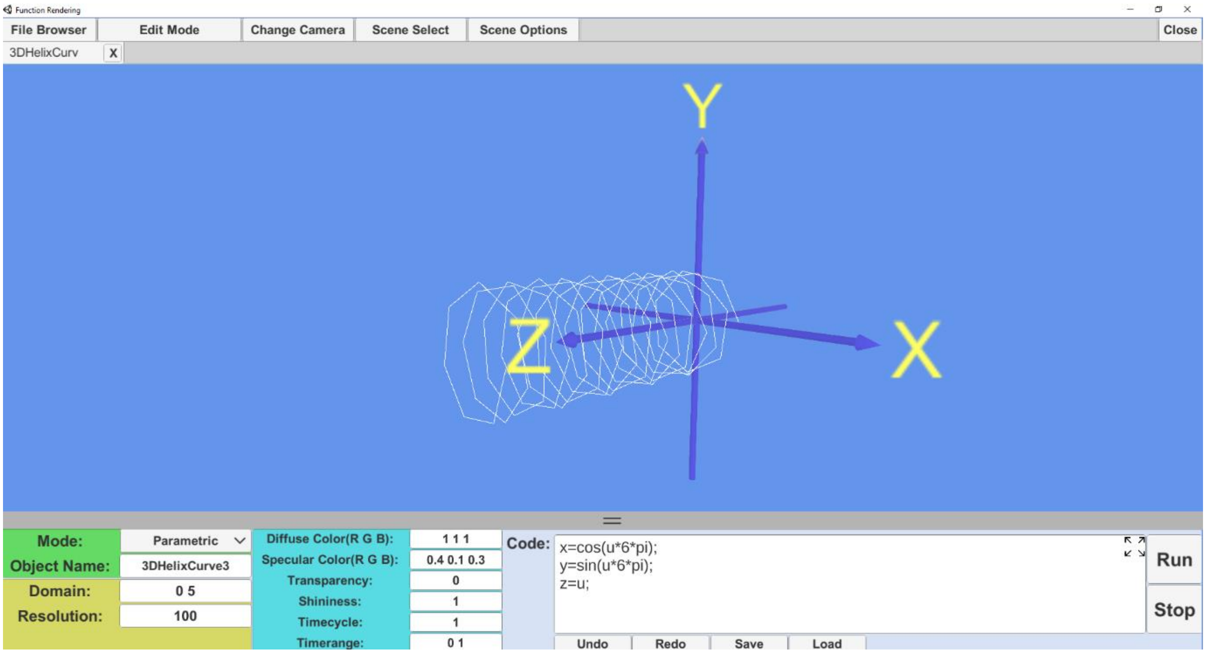
3D Helix



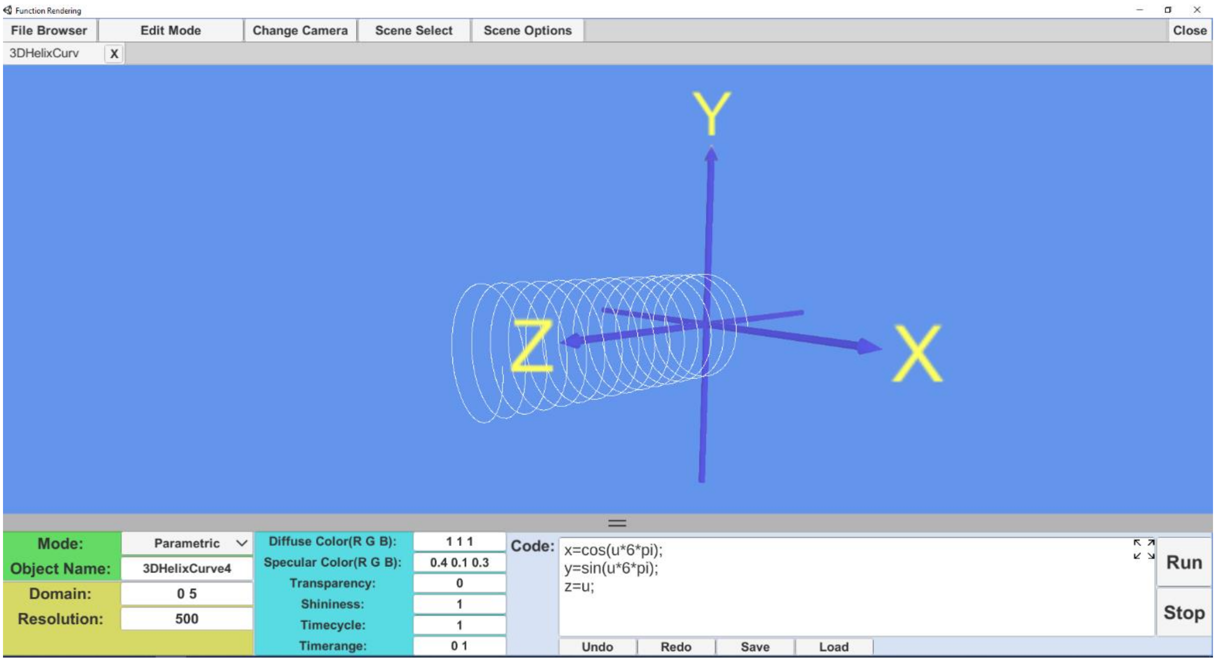
Curve 1



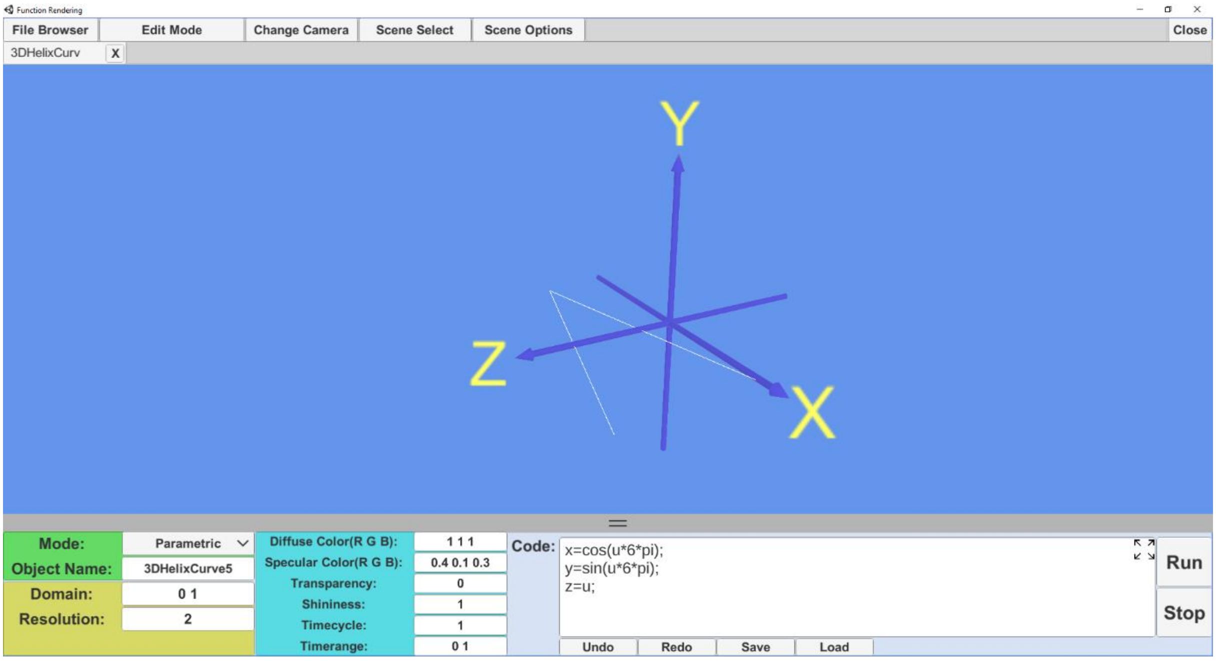
Curve 2



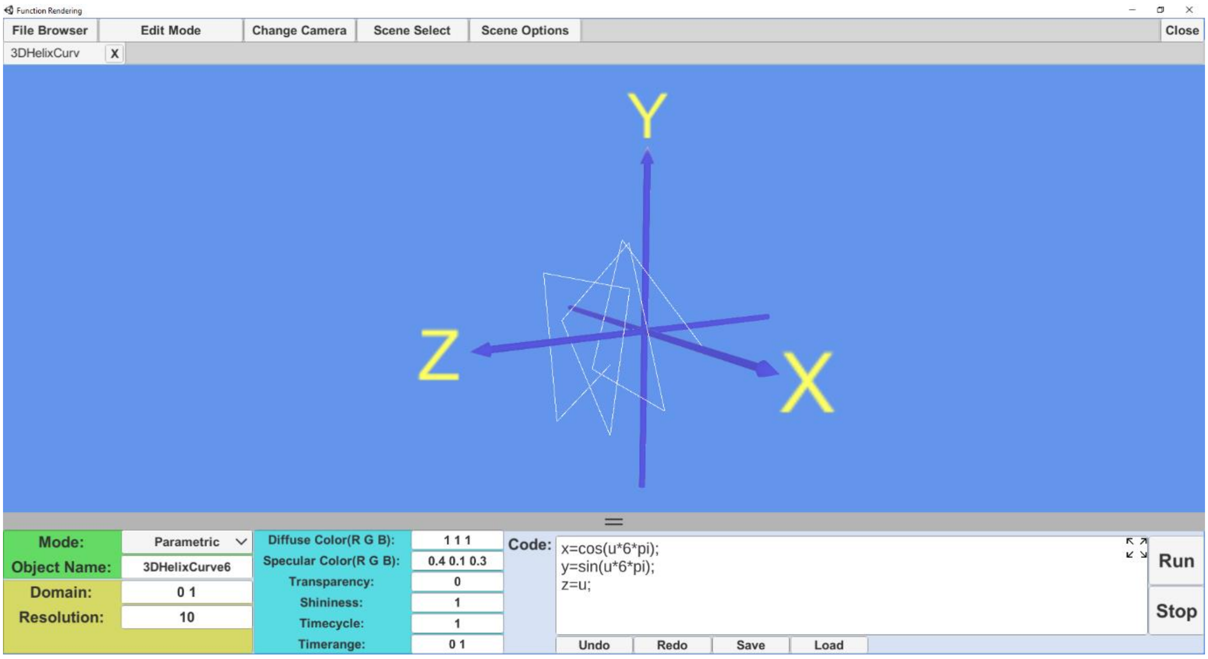
Curve 3



Curve 4



Curve 5



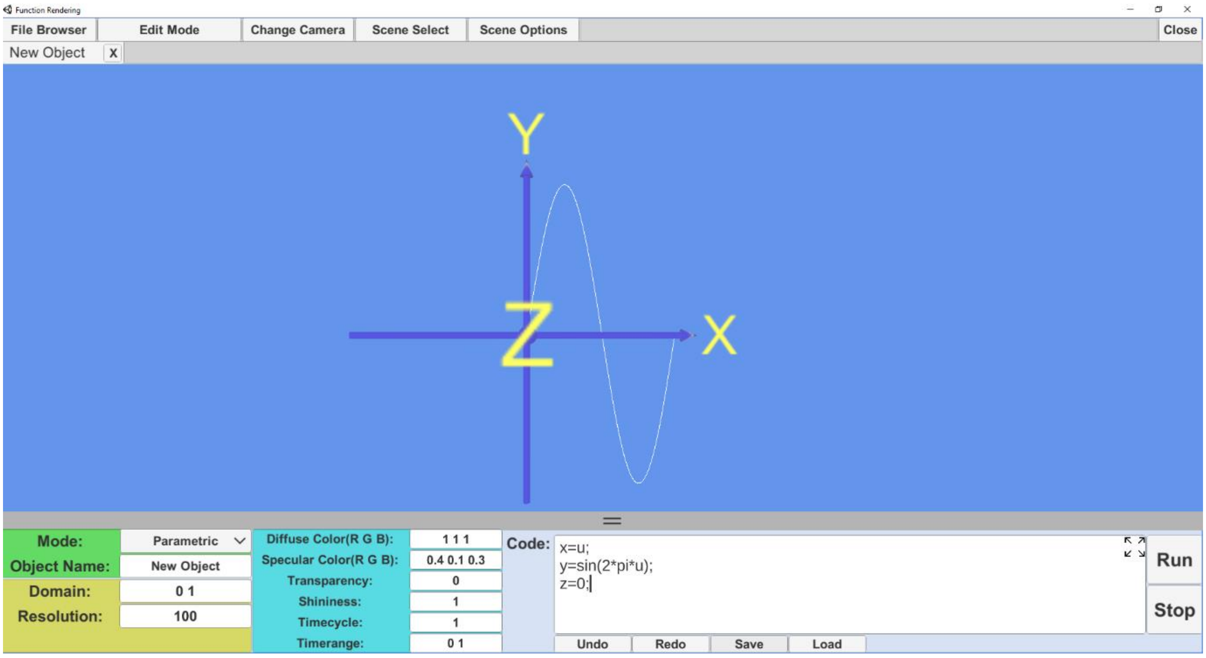
Curve 6

Curve No.	Notes
Curve 1	In 3DHelixCurve1.Func, x = cos(u*6*pi) y = sin(u*6*pi) z = u; The u parameter domain is [0 1]. The sampling resolution is 100.

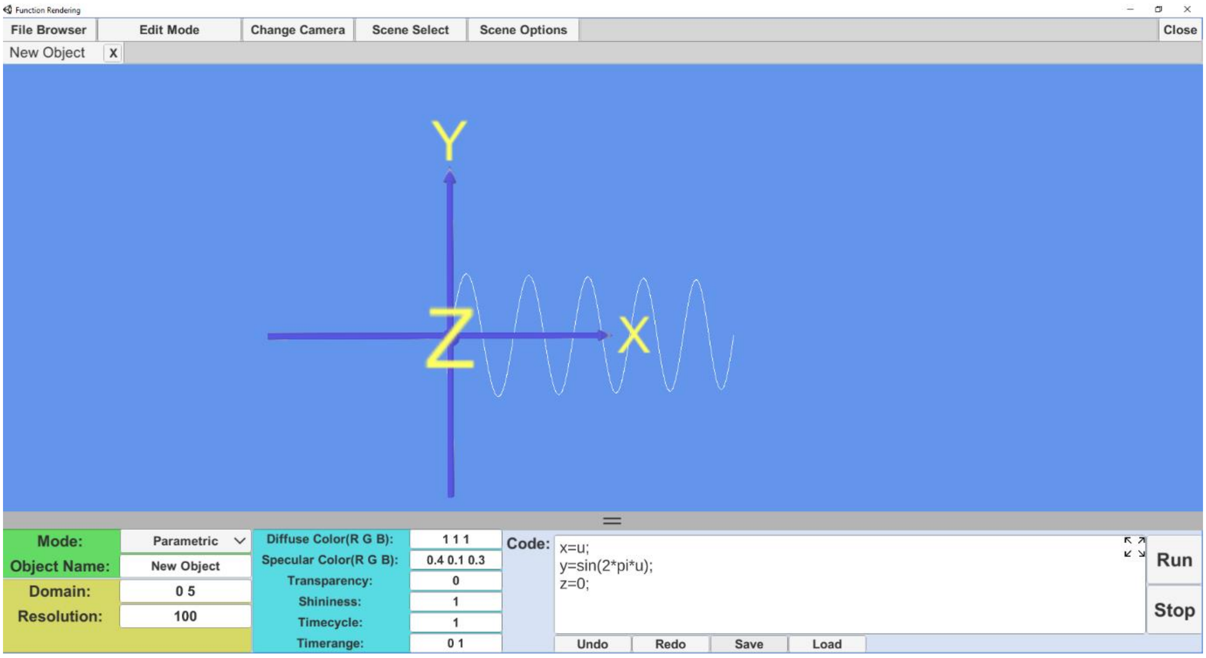
Curve 2	In 3DHelixCurve2.Func, x = cos(u*6*pi) y = sin(u*6*pi) z = u; The u parameter domain is [0 0.5]. The sampling resolution is 100.
Curve 3	In 3DHelixCurve3.Func, x = cos(u*6*pi) y = sin(u*6*pi) z = u; The u parameter domain is [0 5]. The sampling resolution is 100.
Curve 4	In 3DHelixCurve4.Func, x = cos(u*6*pi) y = sin(u*6*pi) z = u; The u parameter domain is [0 5]. The sampling resolution is 500.
Curve 5	In 3DHelixCurve5.Func, x = cos(u*6*pi) y = sin(u*6*pi) z = u; The u parameter domain is [0 1]. The sampling resolution is 2.
Curve 6	In 3DHelixCurve6.Func, x = cos(u*6*pi) y = sin(u*6*pi) z = u; The u parameter domain is [0 1]. The sampling resolution is 10.

As z = u, the parameter domain will affect the elongation of the 3D Helix in Z axis. As the domain decreases, both the number of spiral and the length along the Z axis decreases. When the domain increases, the number of spiral and the length of the Helix along the Z axis increases. However, if the resolution remains at 100 as shown in curve 3, a curve produced will not be a smooth curve. In curve 4, the sampling resolution changed to 500, the curve produced is smooth curve. Therefore, the higher the sampling resolution, the smoother the curve produced.

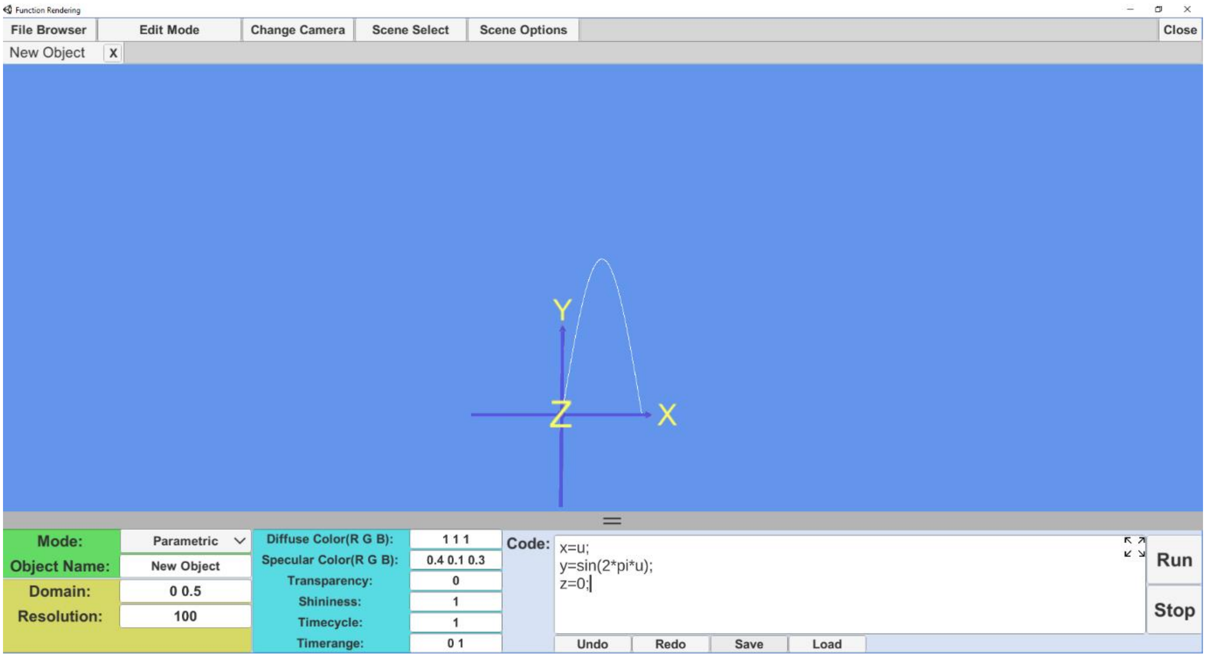
Sine Curve



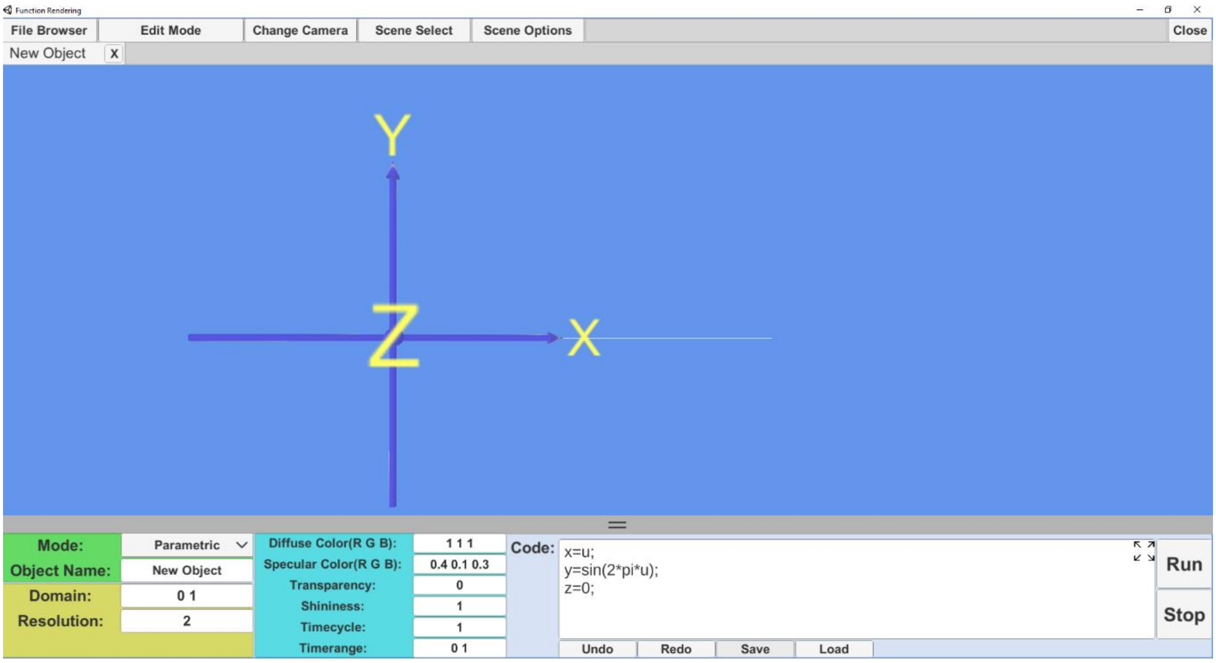
Curve 1



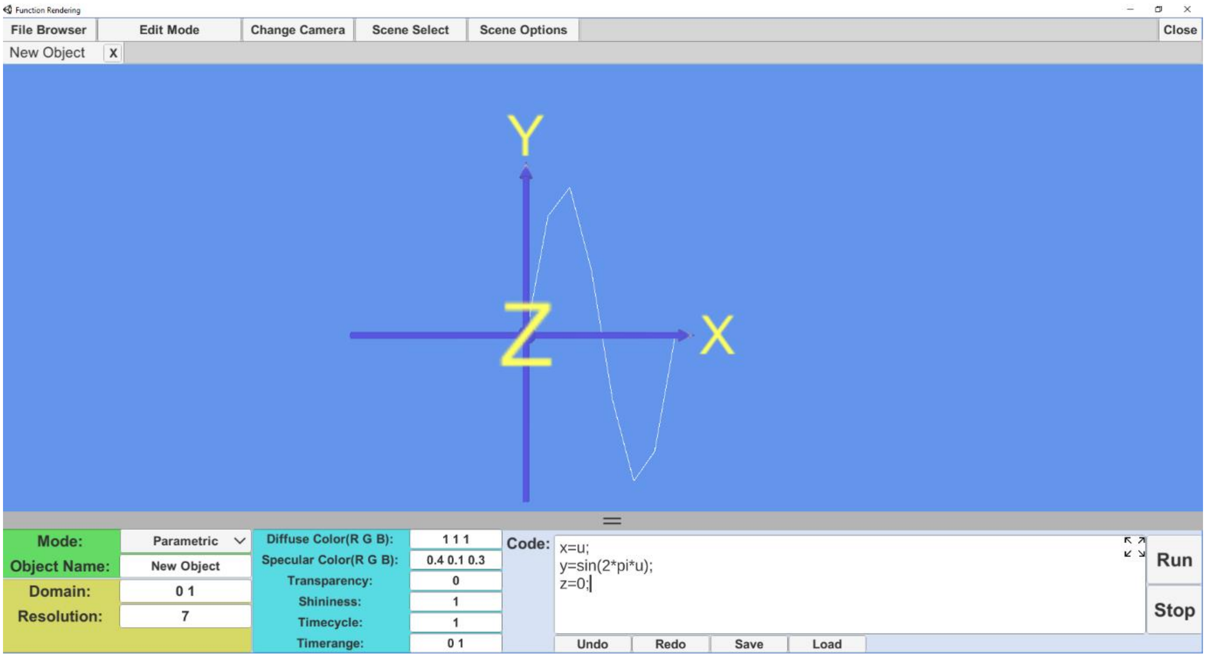
Curve 2



Curve 3



Curve 4



Curve 5

Curve No.	Notes

Curve 1	In SineCurve1.Func,
	x=u;
	y=sin(2*pi*u);
	z=0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 100.

Curve 2	In SineCurve2.Func,
	x=u;
	y=sin(2*pi*u);
	z=0;
	
	The u parameter domain is [0 5].
	The sampling resolution is 100.

Curve 3	In SineCurve3.Func,
	x=u;
	y=sin(2*pi*u);
	z=0;
	
	The u parameter domain is [0 0.5].
	The sampling resolution is 100.

Curve 4	In 3DHelixCurve4.Func,
	x=u;
	y=sin(2*pi*u);
	z=0;
	
	The u parameter domain is [0 1].

	The sampling resolution is 2.

Curve 5	In SineCurve5.Func,
	x=u;
	y=sin(2*pi*u);
	z=0;
	
	The u parameter domain is [0 1].
	The sampling resolution is 6.

Comparing curve 1 and curve 5, it can be noted that the higher the resolution, the smoother the curve. This is because more sampling points are needed when forming curves as compared to straight lines. Therefore, the peak of the sine curve is sharper when the resolution is low.

The change in curves parameter domains affects the amplitude and number of periods in the sine curve. Comparing curve 2 and curve 3, the higher the curve parameter domain, the lower the amplitude of the curve, the higher the frequency of the curve, and vice versa.