Animation Effects using a Timer

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Using Timers with Shaders

glman has a built-in Timer variable. You just need to declare it:

uniform float Timer;

Then, just use it in your code.

It goes from 0. to 1. in 10 seconds, and then instantly back to 0.

Or, you can program a Timer yourself in your .cpp program:

```
float Timer;                                          // global variable
const  int  MS_PER_CYCLE  =  10*1000;                 // 10,000 ms = 10 seconds
. . .
void
Animate( )
{
        int ms = glutGet( GLUT_ELAPSED_TIME );
        ms %= MS_PER_CYCLE;
        Timer = (float)ms / (float)MS_PER_CYCLE;      // 0. to 1. in 10 seconds
        glutSetWindow( MainWindow );
        glutPostRedisplay( );
}

void
InitGraphics( )
{
. . .
        glutIdleFunc( Animate );
}
```

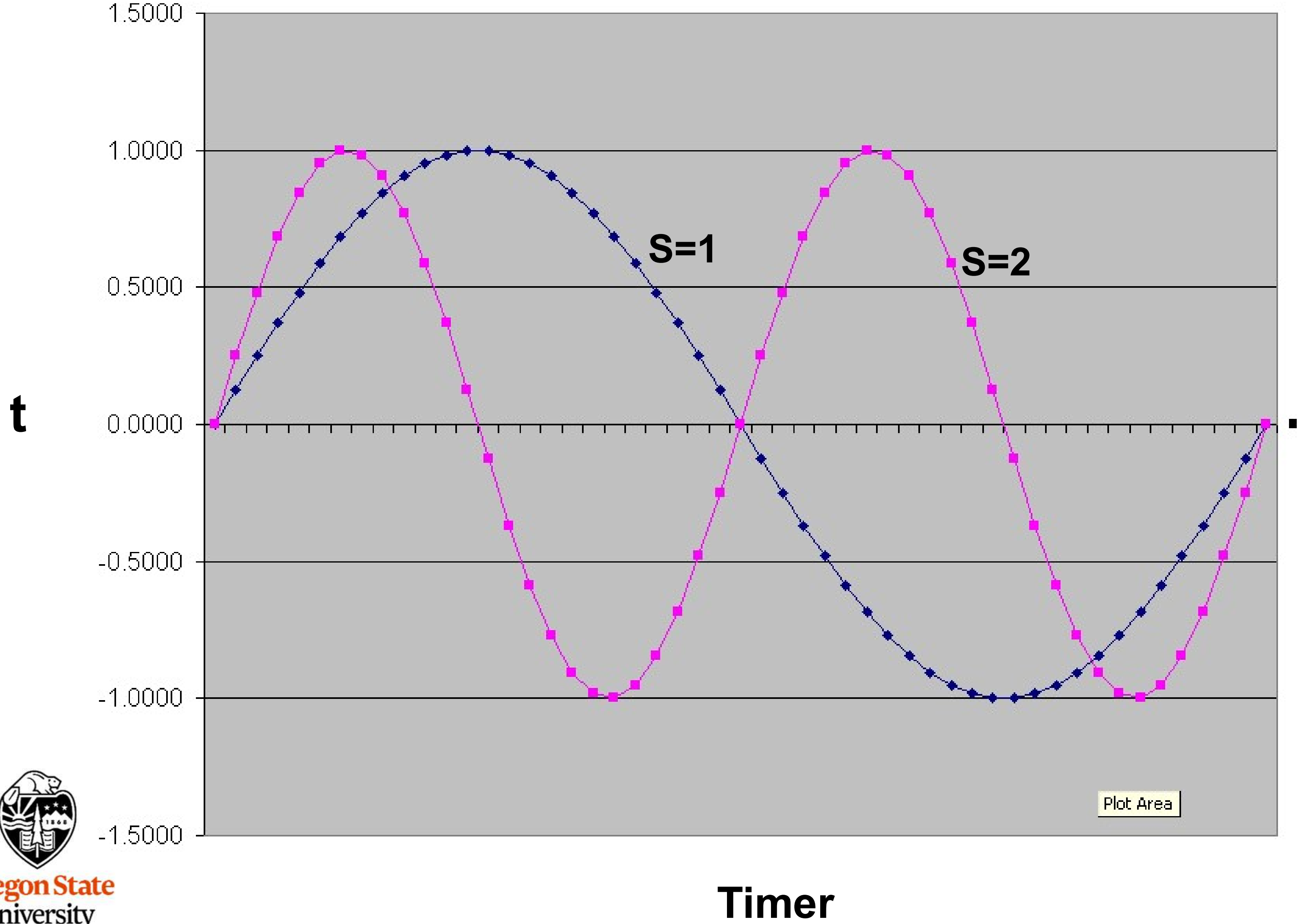
Fun With Zero-to-One: There are many ways to map 0.→1. to a different function

Single ramp 0.→1.	float t = Timer;
	float t = Timer*Timer;
	float t = Timer*Timer*Timer;
	float t = 3.*Timer^2 – 2.*Timer^3;
	float t = 10.*Timer^3 – 15.*Timer^4 + 6.*Timer^5

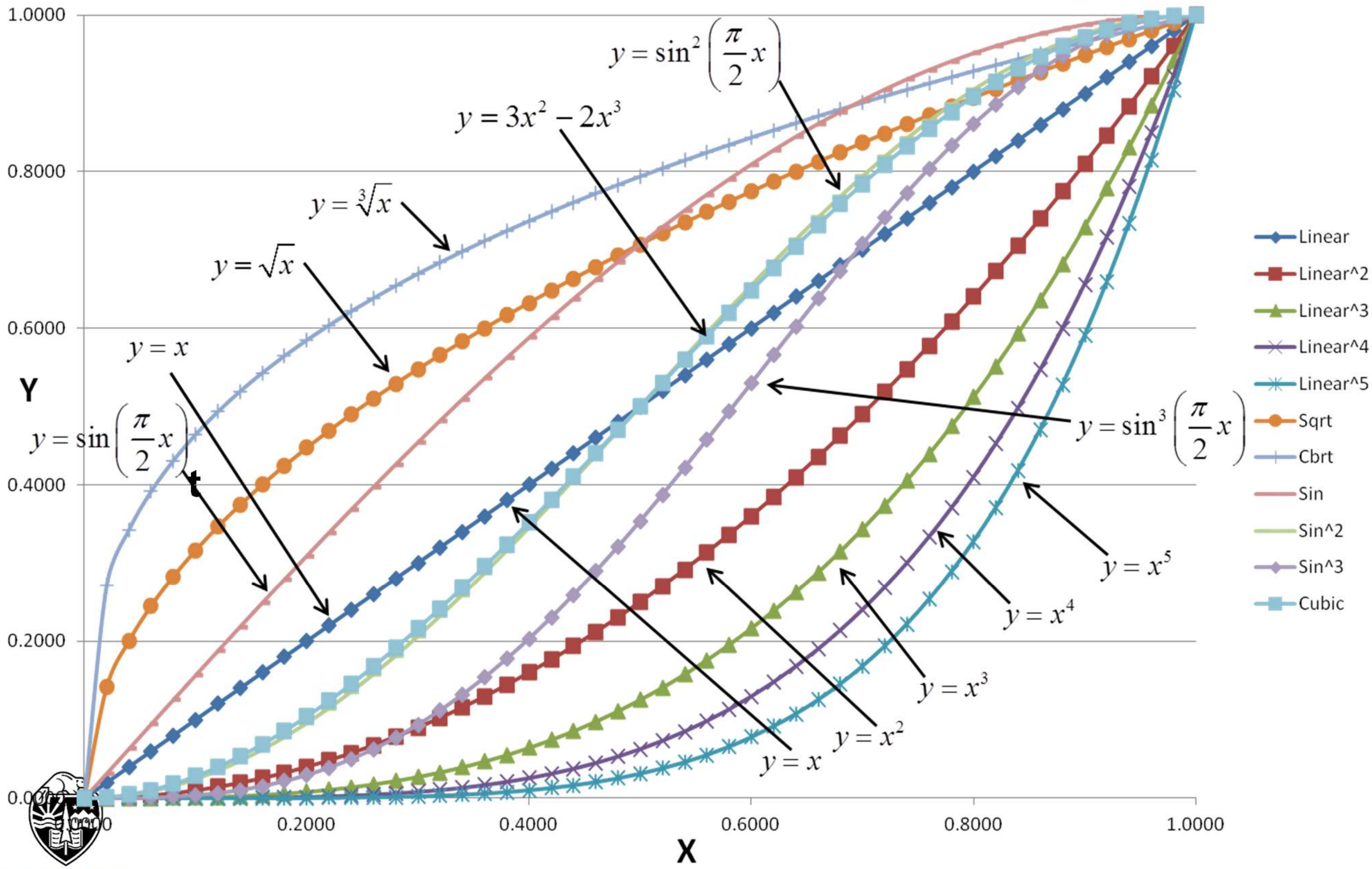
Double ramp 0.→1. →0.	float t;
	if(Timer <= .5)
	    t = 2.*Timer;
	else
	    t = 2. * (1. – Timer);

Smooth oscillation -1. → 1. → -1.	float t = sin(2.*π*Timer);
Smooth oscillation 0. → 1. → 0.	float t = .5 + .5*sin(2.*π*Timer);
Faster oscillation	float t = sin(2.*π*S*Timer);
Bigger oscillation	float t = Mag * sin(2.*π*S*Timer);

float t = sin(2.*π*S*Timer);



Fun-With-Zero-To-One



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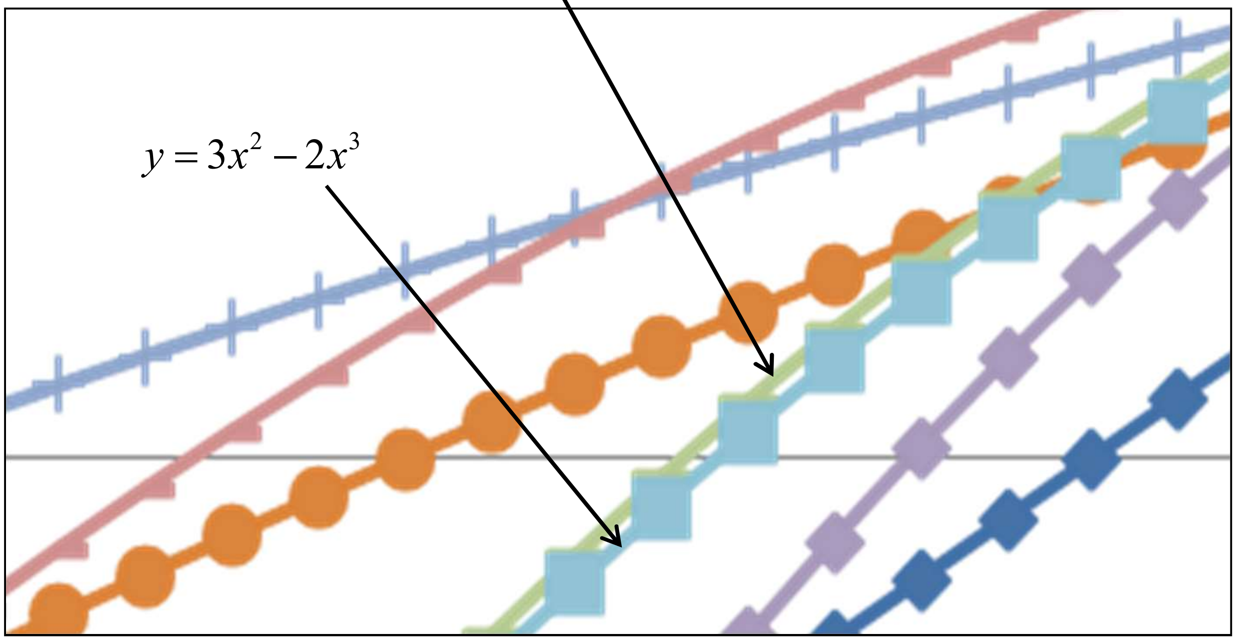
Sidebar: Why Do These Two Curves Match So Closely?

$y = \sin^2\left(\frac{\pi}{2}x\right)$

$y = 3x^2 - 2x^3$



The Taylor Series expansion of $y = \sin^2\left(\frac{\pi}{2}x\right)$ around x=0.5 is:

$$y = \left(\frac{1}{2} - \frac{\pi}{4} + \frac{\pi^3}{96}\right) + x\left(\frac{\pi}{2} - \frac{\pi^3}{16}\right) + x^2\left(\frac{\pi^3}{8}\right) - x^3\left(\frac{\pi^3}{12}\right)$$

$$= .038 - .37x + 3.88x^2 - 2.58x^3$$

which is somewhat close to: $y = 3x^2 - 2x^3$