# Mixing

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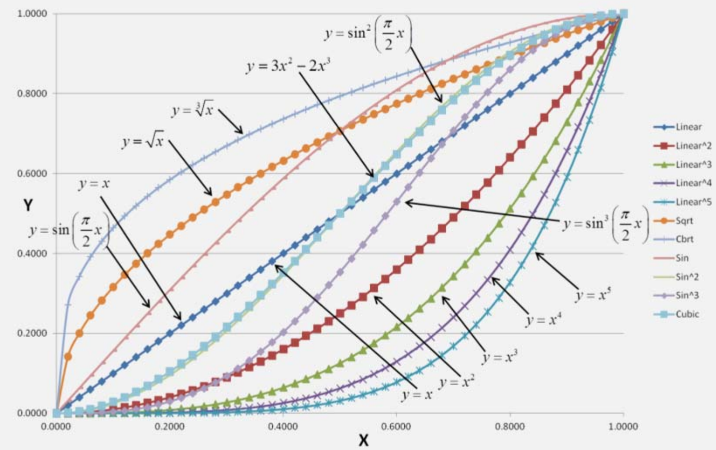
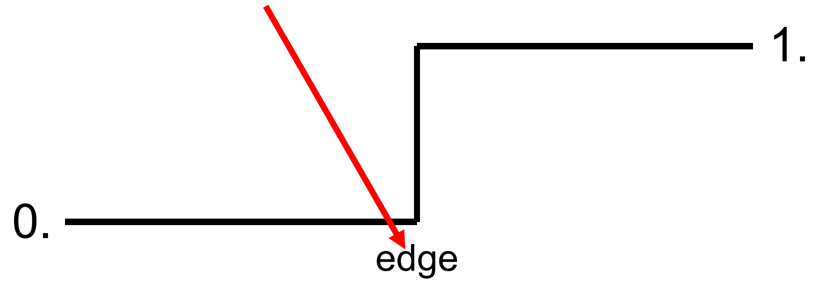
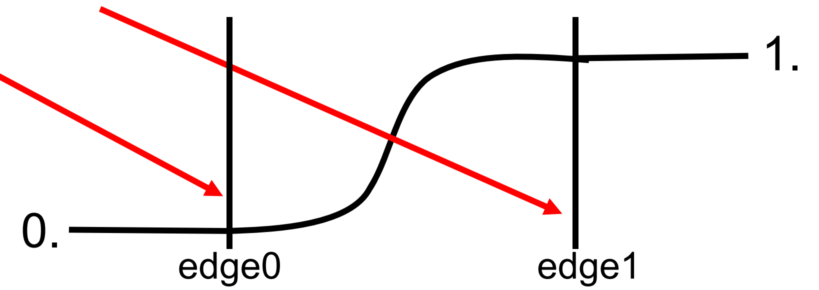


# Mixing

// create a value of 0. or 1. from the value of x wrt edge:
float t = step( float edge, float x );



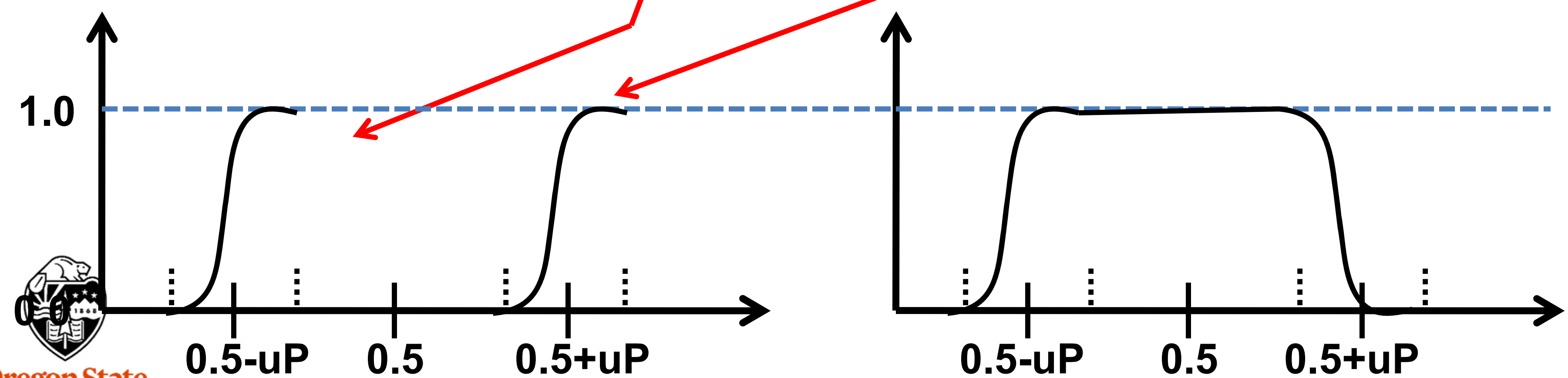

// create a value in the range 0. to 1. from the value of x wrt edge0 and edge1:
float t = smoothstep( float edge0, float edge1, float x );



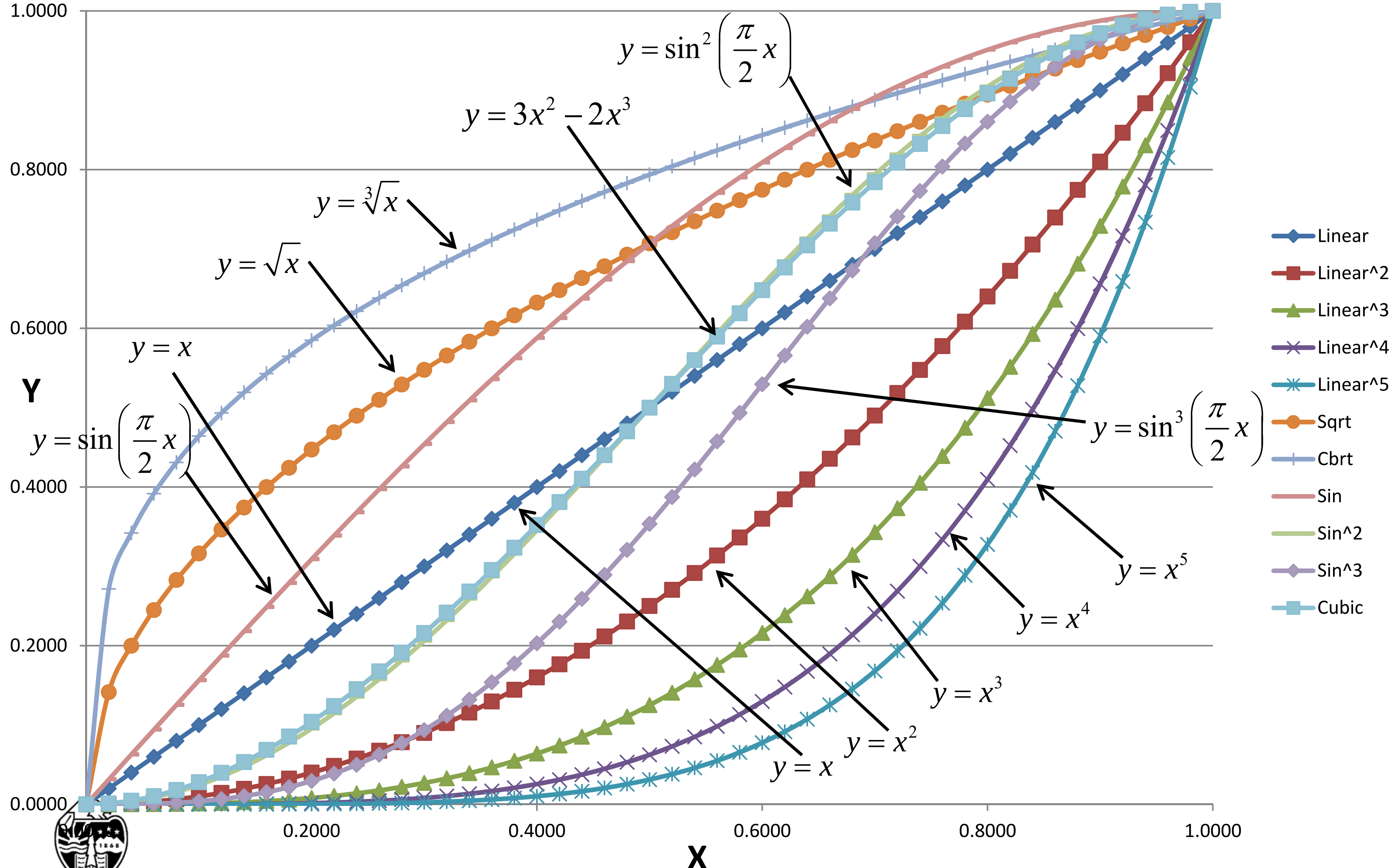

// use the returned value from step( ) or smoothstep( ) to blend value0 to value1:
T out = mix( T value0, T value1, float t );

# “SmoothPulse” in a Fragment Shader

```
in float  vX, vY;
in vec4 vColor;
in float  vLightIntensity;

uniform float uA;
uniform float uP;
uniform float uTol;

 const vec4 WHITE = vec4( 1., 1., 1., 1. );

void
main( )
{
        float f = fract( uA*vX );

        float t = smoothstep( 0.5-uP-uTol, 0.5-uP+uTol, f )  -  smoothstep( 0.5+uP-uTol, 0.5+uP+uTol, f );
        gl_FragColor = mix( WHITE, vColor, t );
        gl_FragColor.rgb *= vLightIntensity;
}
```



# Fun With One

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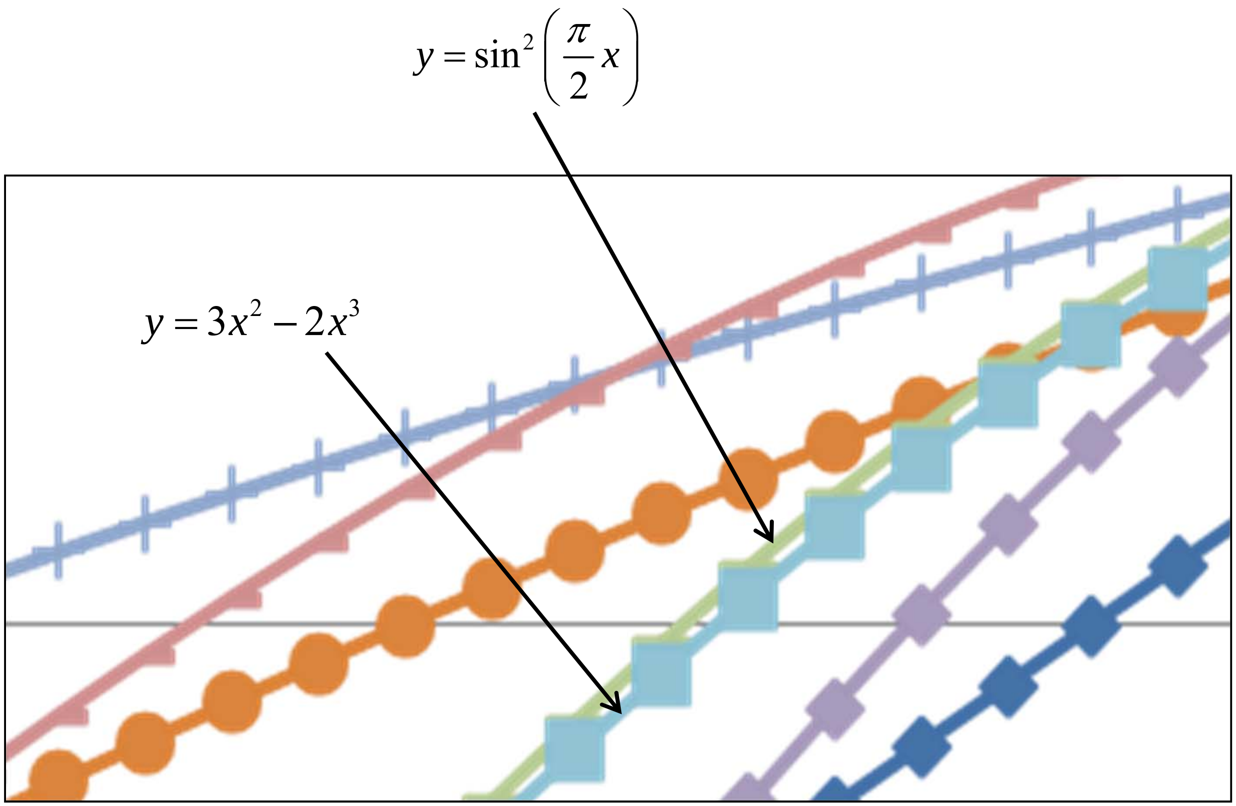
Moral: There are many ways to turn [ 0. - 1. ] into [ 0. - 1. ]

# Why Do These Two Curves Match So Closely?




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

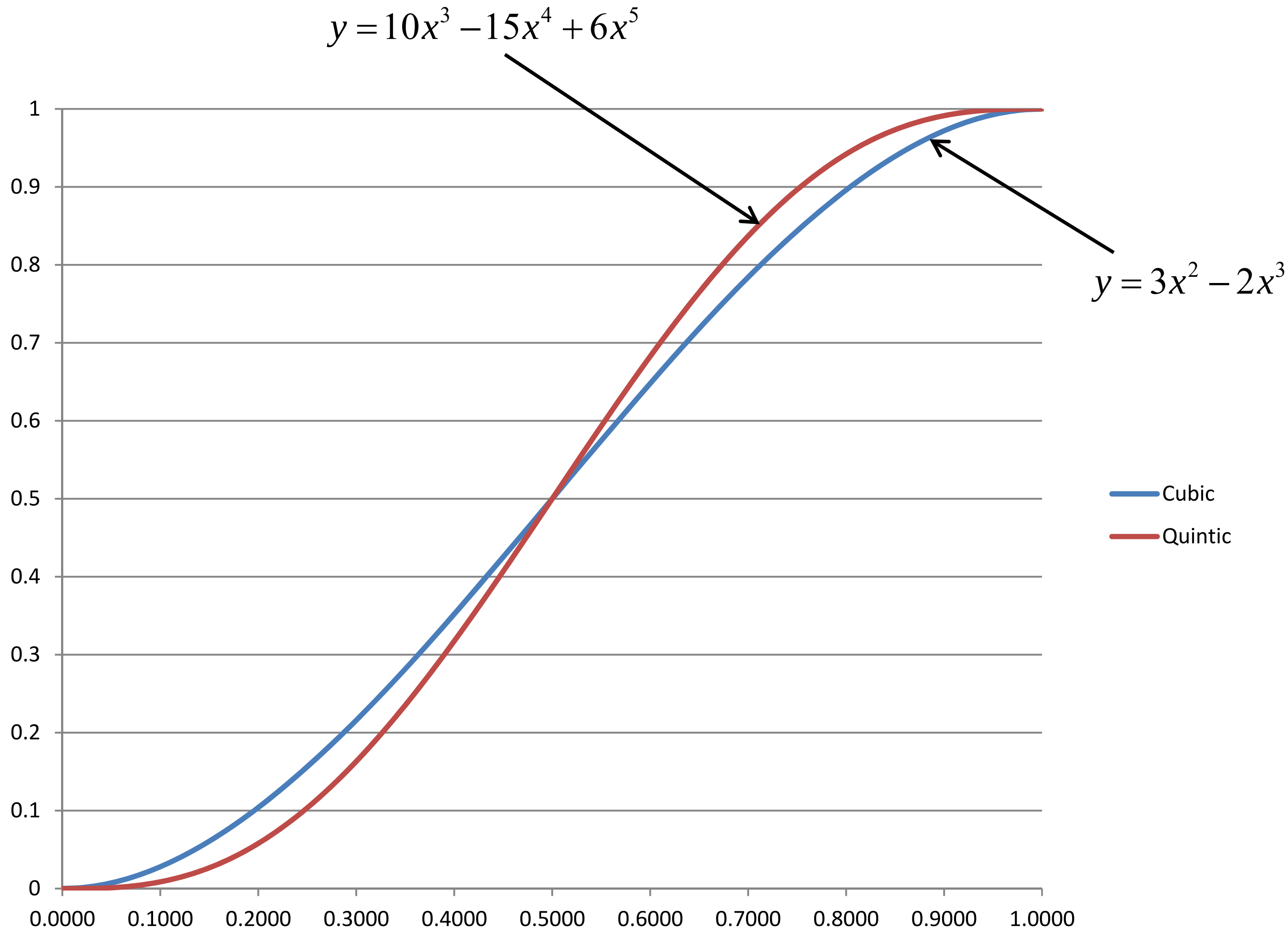
$$y = \left(\frac{1}{2} - \frac{\pi}{4} + \frac{\pi^3}{96}\right) + x\left(\frac{\pi}{2} - \frac{\pi^3}{16}\right) + x^2\left(\frac{\pi^3}{8}\right) - x^3\left(\frac{\pi^3}{12}\right)$$

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

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

# Cubic vs. Quintic



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Both go from 0. to 1.
Both have initial and final slopes of 0.
The quintic has initial and final curvatures of 0.