Sigfixes Derivation

The following is the linear interpolation function of draw delay:

$$f(t) = \frac{1000}{\text{draw delay}} t$$

The following is the exponential interpolation function:

$$g(t) = 1 - \left(1 - \frac{1}{a}\right)^{60t}$$

where t is measured in seconds.

Delta uses linear interpolation, but the start time is reset every frame. At infinite FPS, this would match exponential interpolation. But most computers run at 60FPS.

We want to find a factor a such that $f(1/60) = g(1/60)$.

$$f(1/60) = g(1/60)$$

$$\Rightarrow \quad \frac{1000}{\text{draw delay}} \cdot \frac{1}{60} = 1 - \left(1 - \frac{1}{a}\right)^{60 \cdot 1/60}$$

$$\Rightarrow \quad \frac{1000}{60} \cdot \frac{1}{\text{draw delay}} = \frac{1}{a}$$

$$\Rightarrow \quad \frac{60}{1000}(\text{draw delay}) = a$$