Before we look at base 2 we'll look at what happens in base 10 first.

$$\frac{1}{3} = \frac{1}{3} \cdot 10^0 \tag{1}$$

$$= \frac{1 \cdot 10^1}{3} \cdot 10^{-1} \tag{2}$$

$$= \frac{1 \cdot 10^2}{3} \cdot 10^{-2} \tag{3}$$

$$= \frac{1 \cdot 10^n}{3} \cdot 10^{-n} \tag{4}$$

As n gets larger our precision increases.

$$\frac{1 \cdot 10^2}{3} \cdot 10^{-2} = 0.33 \tag{5}$$

$$\frac{1 \cdot 10^5}{3} \cdot 10^{-5} = 0.33333 \tag{6}$$