

Simplifying can make things less complex

Consider the equation

$$x = r^{\left[\frac{k-1}{k} \right]} - 1$$

If we know values of r and k , we can easily compute x . What if we know x and r and need to compute k ? No problem... we can use a symbolic algebra software package to derive the equivalent equation in terms of k .

$$k = \frac{\ln(r)}{\ln(r) - \ln(x+1)}$$

Inverting both sides, we can also say the following.

$$\frac{1}{k} = 1 - \frac{\ln(x+1)}{\ln(r)}$$

We now have an equation which can solve for any of the three variables if given the other two. Let's try the following inputs... $r = 2$ and $k = 1$. TK solves for $x = 0$.

Of course, the simplest approach of all might have been to simplify the first equation such that each of the variables appears just once. Since $(k-1)/k = 1 - 1/k$, we have

$$x = r^{\left[1 - \frac{1}{k} \right]} - 1$$

TK's Direct Solver can solve this equation given any two of the three variables. The only condition that will cause an error is when $k = 0$.