

Solve each equation for x .¹

(a) $\ln(\ln(x)) = 1$

$$\ln(\ln(x)) = 1$$

exponentiating both sides

$$e^{\ln(\ln(x))} = e^1$$

$$\ln(x) = e$$

exponentiating both sides again

$$e^{\ln(x)} = e^e$$

$$x = e^e$$

(b) $e^{ax} = Ce^{bx}$, where $a \neq b$

$$e^{ax} = Ce^{bx}$$

It would be best if there were only one exponential function, so we divide both side by e^{bx}

$$\frac{e^{ax}}{e^{bx}} = \frac{Ce^{bx}}{e^{bx}}$$

and apply properties of exponents

$$e^{ax-bx} = C$$

Taking the natural log of both sides gives us

$$\ln(e^{ax-bx}) = \ln(C)$$

$$ax - bx = \ln(C)$$

$$(a - b)x = \ln(C)$$

and since we know $a \neq b$, we get

$$x = \frac{\ln(C)}{a - b}$$

¹Stewart, *Calculus, Early Transcendentals*, p. 67, #54.