

1/28/13 The Natural Log.

The natural log is simply a logarithm with base e . $e \approx 2.71$

Notation: $\ln(x) \Rightarrow$ same as $\log_e(x)$.

Just write it as $\log_e(\)$ and treat it like a normal log.

① Write in exp. form

$$\begin{aligned}\ln(100) &= 4.61 \\ \log_e(100) &= 4.61 \\ \boxed{e^{4.61} &= 100}\end{aligned}$$

② Write in log form:

$$\begin{aligned}e^7 &= 1097 \\ \log_e(1097) &= 7 \\ \boxed{\ln(1097) &= 7}\end{aligned}$$

③ Write as a single log:

$$\begin{aligned}\frac{1}{3} \ln(8) + \ln(5) + 3 \\ \log_e(8^{1/3}) + \log_e(5) + 3 \\ \log_e(2) + \log_e(5) + 3 \cdot 1 \\ \log_e(2 \cdot 5) + 3 \log_e(e) \\ \log_e(10) + \log_e(e^3) = \log_e(10e^3) = \boxed{\ln(10e^3)}\end{aligned}$$

④ Solve for x :

$$\begin{aligned}\ln(\sqrt{x}) &= 3 \\ \log_e(x^{1/2}) &= 3 \\ \frac{1}{2} \log_e(x) &= (3) \cdot 2 \\ \log_e(x) &= 6 \\ \boxed{e^6 &= x}\end{aligned}$$

⑤ $e^{3x} = 8$

$$\begin{aligned}\log_e(e^{3x}) &= 8 \\ 3x \log_e(e) &= 8 \\ \underline{3} &\end{aligned}$$

$$\frac{3x}{3} = \frac{8}{3} \quad \boxed{x = \frac{8}{3}}$$