

$$\begin{aligned} \textcircled{2} \quad \frac{\log_a c}{\log_a b c} &= \log_a c \cdot \log_c ab = \log_a c (\log_c a + \log_c b) \\ &= \frac{\log_a c}{\log_a a} \left(\frac{\log_a a}{\log_a c} + \frac{\log_a b}{\log_a c} \right) = 1 + \frac{\log_a b}{\log_a c} = 1 + \log_a b \end{aligned}$$