

8-12. Evaluate each expression without using a calculator.

$$\text{a. } \log(1) = x \rightarrow 10^x = 1 \quad \log(1) = x$$

$$\text{b. } \log(10^3) = 3 \log_{10}(10) = 3 \cdot 1 = 3$$

$$\text{c. } 10^{\log(4)} = 4$$

$$\begin{aligned} \text{d. } 10^{3\log(4)} &= 10^{\log(4^3)} \\ &= 1 \cdot 4^3 \\ &= 64 \end{aligned}$$

$$\begin{aligned} 10^{\log(1)} &= 10^x \\ \downarrow \\ 1 &= 10^x \\ 0 &= x \end{aligned}$$

$$\begin{aligned} \log_2(8) &= 3 \\ 2^{\log_2(8)} &= 2^3 \\ 8 &= 2^3 \end{aligned}$$

$$\begin{aligned} \log_2(8) \\ \log_2(2^3) \\ 3 \cdot \log_2(2) \\ 3 \end{aligned}$$

8-13. Simplify each expression.

$$i^2 = -1 \quad i = \sqrt{-1}$$

$$a. (3 + 4i) + (7 - 2i) = 10 + 2i$$

$$b. (3 + 5i)^2$$

$$b. \begin{array}{c} 3 \quad +5i \\ \begin{array}{|c|c|} \hline 9 & 15i \\ \hline 15i & 25i^2 \\ \hline \end{array} \\ +5i \end{array}$$

$$9 + 15i + 15i + 25(-1) \\ = -16 + 30i$$

$$c. (7 + i)(7 - i)$$

$$d. (3i)(2i)^2$$

$$e. i^3$$

$$f. i^{32}$$

$$d. (3i)(2i)^2 \\ (3i)(2i)(2i) \\ 6i^2(2i) \\ 6(-1)(2i) \\ -12i$$

$$e. i^3 = i^2 \cdot i^1 \\ = -1 \cdot i \\ = -i$$

8-17. Given that $\log(2) \approx 0.3010$, $\log(3) \approx 0.4771$, and $\log(5) \approx 0.6990$, calculate each of the following logarithms without using the log button on your calculator.

[Help](#) 

a. $\log(6)$

b. $\log(15)$

c. $\log(9)$

d. $\log(50)$