

Problem

Use the definition of logarithm to fill in the blanks below.

a. $\log_2 8 = 3$ because _____.

b. $\log_5 \left(\frac{1}{25} \right) = -2$ because _____.

c. $\log_4 4 = 1$ because _____.

d. $\log_3(3n) = n$ because _____.

e. $\log_4 1 = 0$ because _____.

Step-by-step solution

Step 1 of 5

(a) $\log_2 8 = \log_2 2^3$

$$= 3 \log_2 2$$

$$= 3(1)$$

$$= 3$$

Since $\log_a m^n = n \log_a m$, $\log_a a = 1$

Step 2 of 5

(b) $\log_5 \left(\frac{1}{25} \right) = \log_5 (25)^{-1}$

$$= \log_5 5^{-2}$$

$$= -2 \log_5 5$$

$$= -2(1)$$

$$= -2$$

Step 3 of 5

(c) $\log_4 4 = 1$ because $4^1 = 4$

Step 4 of 5

(d) $\log_3 3^n = n$ because $\log_a m^n = n \log_a m$ and

$$\log_a a = 1$$

Step 5 of 5

(e) $\log_4 1 = 0$ because $4^0 = 1$