

x y 3 $+$ π $-$

3.3 Properties of Logarithms

Change of base Formula

$$\log_a x = \frac{\log x}{\log a}$$

1.) $\log_4 25$

2.) $\log_2 12$

3.) $\log_3 16$

4.) $\log_5 22$

Other Properties

Product Property:

$$\log_a (u \cdot v) = \log_a u + \log_a v$$

Quotient Property:

$$\log_a (u/v) = \log_a u - \log_a v$$

Power Property:

$$\log_a u^n = n \log_a u$$

$$x^5 \cdot x^3 = x^8$$

$$\frac{x^5}{x^3} = x^2$$

Examples

$$1.) \log_5(5x) = \log_5(5) + \log_5(x)$$

$$1 + \log_5(x)$$

$$2.) \log_8\left(\frac{1}{4}\right) = \log_8(1) - \log_8(4)$$

$$0 - \log_8(4) = -\log_8(4)$$

$$3.) \log_2 x^7 = 7 \cdot \log_2(x)$$

Practice Problems

- Wkst 3.3 # 41-60
- Quiz 3.2-3.3- Friday
- Hmwk – pg 243# 39-52, ~~53~~, 61-72

pg 243 #20-31

$$(20) \log\left(\frac{9}{300}\right) = \log\left(\frac{3}{100}\right)$$

$$\log(3) - \log(100)$$

$$\boxed{\log(3) - 2}$$

$$(21) \ln(5e^6)$$
$$\ln 5 + \ln e^6$$

$$\boxed{\ln(5) + 6}$$

$$(22) \ln\left(\frac{6}{e^2}\right)$$

$$\ln(6) - \ln e^2$$

$$\boxed{\ln(6) - 2}$$

$$(26) \log_6 \sqrt[3]{6}$$

$$6^x = 6^{\frac{1}{3}}$$

$$\boxed{x = \frac{1}{3}}$$

$$(27) \log_4 16^{1.2}$$

$$4^x = 16^{1.2}$$

$$4^x = 4^{2 \cdot 1.2}$$

$$\boxed{x = 2.4}$$