

Sec 4.3.2 Logarithms ~Expanding~

Log Rules

$$\mathbf{Log(AB) = LogA + LogB}$$

Log Form
 $\log_2 16 = 4$

$$\mathbf{Log\left(\frac{A}{B}\right) = LogA - LogB}$$

Equivalent
to

$$\mathbf{Log(A^n) = n \times LogA}$$

Index Form
 $2^4 = 16$

Completely expand-

$$\log_4 7(5)$$

$$\log_4 7 + \log_4 5$$

$$\log 10x$$

$$\log 10 + \log x$$
$$1 + \log x$$

;

$$\log_7 (19/x)$$

$$\log_7 \frac{19}{x}$$

$$\log_7 19 - \log_7 x$$

$$\ln (e^3/7)^3$$

$$\ln \frac{e^3}{7}$$

$$\ln e^3 - \ln 7$$

$$3 \ln e - \ln 7$$

$$3 - \ln 7$$

$$\log_5 7^4$$

$$4 \log_5 7$$

$$\ln \sqrt{x} = \ln x^{1/2}$$

$$= \frac{1}{2} \ln x \rightarrow \frac{\ln x}{2}$$

$$\log (4x)^5$$

$$5 \log 4x$$

$$5 (\log 4 + \log x)$$

$$\text{or } 5 \log 4 + 5 \log x$$

$$\log_b x^2 y$$

$$\log_b x^2 + \log_b y$$

$$2 \log_b x + \log_b y$$

$$\log_6 \frac{\sqrt[3]{x}}{36y^4}$$

$$\log_6 \frac{x^{1/3}}{36y^4}$$

$$\log_6 x^{1/3} - \log_6 36y^4$$

$$\frac{1}{3} \log_6 x - (\log_6 36 + \log_6 y^4)$$

$$\frac{1}{3} \log_6 x - 2 - 4 \log_6 y$$

$$\log \frac{100x^3 \sqrt[3]{5-x}}{3(x+7)^2}$$

$$\log 100x^3 (5-x)^{1/3} - \log 3(x+7)^2$$

$$\log 100 + \log x^3 + \log (5-x)^{1/3} - (\log 3 + \log (x+7)^2)$$

$$2 + 3 \log x + \frac{1}{3} \log (5-x) - \log 3 - \log (x+7)^2$$

$$2 + 3 \log x + \frac{1}{3} \log (5-x) - \log 3 - 2 \log (x+7)$$

Suggested Practice
Sec 4.3
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left column

$$1. \log_5 7 + \log_5 3$$

$$4. 1 + \log_9 x$$

$$7. 1 - \log_7 x$$

$$10. \log x - 3$$

$$13. 2 - \ln 5$$

$$16. 7 \log_b x$$

$$19. \frac{1}{5} \ln x$$

$$22. \log_b + 3 \log_{\frac{b}{y}}$$

$$25. 2 - \frac{1}{2} \log(x+1)$$

$$28. 3 \log_b x + \log_b y - 2 \log_b 7$$

$$31. \frac{1}{3} (\log x - \log y)$$

$$34. \frac{1}{3} \log_b x + 4 \log_b y - 5 \log_b 7$$

$$37. 3 \ln x + \frac{1}{2} \ln(x^2 + 1) - 4 \ln(x + 1)$$

$$39. 1 + 2 \log x + \frac{1}{3} \log(1-x) - \log 7 - 2 \log_{\frac{1}{10}}$$

