Algebra 2 Unit 8 worksheet: Evaluating logarithms, common and natural

Name _____ Date _____ Period _____

1. Evaluate each logarithm without a calculator.

(a) $\log_{17} 1$

(b) $\log_2 \dfrac{1}{32}$

(c) $\log_4 0.25$

(d) $\log_{1/5} \dfrac{1}{625}$

(e) $\log_{0.1} 1000$

(f) $\log_{2/3} \dfrac{9}{4}$

2. Evaluate each logarithm without a calculator. Write the base and the argument as powers of one smaller base where that helps.

(a) $\log_{16} 8$

(b) $\log_{1/8} \dfrac{1}{16}$

(c) $\log_4 \sqrt[3]{2}$

(d) $\log_{\sqrt[3]{5}} 25$

(e) $\log_8 \dfrac{1}{\sqrt{2}}$

(f) $\log_{0.04} 125$

3. Evaluate exactly. Here log is the common logarithm and ln the natural logarithm.

(a) $\ln 1$

(b) $\log \dfrac{1}{\sqrt{10}}$

(c) $\log \left(100\sqrt[3]{10}\right)$

(d) $\ln \left(e^2\sqrt{e}\right)$

(e) $\ln \dfrac{1}{e^{-3}}$

(f) $10^{\log 4.5}$

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4. Without a calculator, find the two consecutive integers that each of these logarithms lies between. Then list all six from least to greatest. You may use $e^{-2} \approx 0.135$, $e^{-1} \approx 0.368$, $e^{5} \approx 148.4$ and $e^{6} \approx 403.4$.

$$\log 470 \qquad \ln 150 \qquad \log_2 30 \qquad \log 0.00093 \qquad \ln 0.2 \qquad \log_5 0.5$$

5. Without evaluating, say whether each value is positive, negative, zero, or not a real number. Give a one-line reason.

(a) $\log_7 0.9$

(b) $\log 1.001$

(c) $\log_{2/5} 1$

(d) $\log_{0.5} 6$

(e) $\log_{0.3} 0.2$

(f) $\ln(-4)$

(g) $\log_9 0$

6. Each line of Mateo's work has one error. Explain the error and give the correct value.

(a) $\log_8 2 = 3$, because $2^3 = 8$.

(b) $\log 0.001 = -2$, because 0.001 has two zeros after the decimal point.

(c) $\ln(-e) = -1$, because $\ln e = 1$.

7. (a) Find every whole-number base $b \geq 2$ for which $\log_b 64$ is a whole number, and give $\log_b 64$ for each.

(b) Explain why no whole-number base b makes $\log_b 64 = 4$.

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