

Math 122 Sections 1.5-1.6 Worksheet

Michael Levet

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Simplify the Following Expressions. You should leave the numbers in exponential form (e.g., 2^7). If the expression is an exponential, simplify so there is only one base. If there is a logarithm in your answer, none of the logarithms should be decomposable using the rules of logs.

- $2^5 \cdot 2^7$
- $(3^3 \cdot 9^5)^{-2}$
- $(5^2)^4 \cdot 25^2 \cdot 125^{-5}$
- $\ln(3x^4y^{-7})$
- $\ln\left(x\sqrt{y^2 + z^2}\right)$
- $\ln\left(\frac{x-4}{y^2\sqrt[5]{z}}\right)$

Write each expression as a single logarithm. Justify each step with the appropriate rule of logarithm.

- $2\ln(x) + 5\ln(y) - \frac{1}{2}\ln(z)$
- $3\ln(t+5) - 4\ln(t) - 2\ln(s-1)$
- $\frac{1}{3}\ln(a) - 6\ln(b)$

Solve the following equations. Justify each step with the appropriate rule of exponent or rule of logarithm.

- $6^{2x} = 6^{1-3x}$
- $5^{1-x} = 25$
- $8^{x^2} = 8^{3x+10}$
- $9 = 10^{4x+6}$
- $e^{7+2x} - 3 = 0$
- $e^{4-7x} + 11 = 20$
- $\ln(x^2 - 2x) = \ln(5x - 12)$
- $\ln(6x) - \ln(4 - x) = \ln(3)$
- $\ln(x) + \ln(x+3) = \ln(20 - 5x)$
- $\ln(25 - x^2) = 2$