Logarithms

Self-Test 2

Allow 20 minutes to complete this test.

1. Express \( \ln \sqrt{xy} \) in terms of \( \ln x \) and \( \ln y \).

2. Simplify \( \log x - \log y + \log \frac{y}{x} \).

3. Without using a calculator, evaluate \( \log_5 \sqrt{2} - \log_5 \sqrt{10} \).

4. Express \( \frac{1}{2} \log x - 3 \log(\sin 2x) + 2 \) as a single logarithm.

5. Express \( \ln(x^2 - 4) + \ln(\cos x) - 2 \ln(x - 2) \) as a single logarithm.

6. Simplify the expression \( 10^{2 \log x} \).

7. Simplify the expression \( \ln (e^{-x})^3 \).

8. Solve the equation \( 3^{x-3} = 9^{4-x} \) for \( x \).

9. Solve the equation \( \ln x + 2 \ln(2x^3) = \ln 4 \) for all possible values of \( x \).

10. Solve the equation \( \frac{1}{1 - 3e^{2x}} = 4 \) for the exact value of \( x \).