In problems 1 - 4, use the properties of logarithms to expand each logarithmic expression as much possible. Where possible, evaluate logarithmic expressions without using a calculator.

1. $\log(10000xy)$

2. $\log_3\left(\dfrac{81}{x}\right)$

3. $\ln\left(\dfrac{e^3}{x}\right)$

4. $\log_4\left(\dfrac{16\,x^2}{y^3}\right)$

In problems 5 - 8, use properties of logarithms to condense each logarithmic expression. Write the expression as a single logarithm whose coefficient is 1.

5. $\log 25 + \log 4$

6. $\log_2 x - \log_2 y$

7. $2\ln x + 4\ln y - 3\ln z$

8. $2\log_3 x - 3\log_3 y$

In problems 9 - 10, use common logarithms or natural logarithms and a calculator to evaluate to four decimal places. (Use the change of base formula.)

9. $\log_8 25$

10. $\log_{27} 13$

Solving the following logarithmic equations.

11. $\log_2(x-5)=\log_2 17$

12. $\log(x-9)=\log(x+4)+\log 3$

13. $2\log_7 x=\log_7 64$

14. $\log(x-9)=\log(x+4)+\log 3$

15. $\log(x+3)+\log(x-2)=\log 14$