Homework: Properties of Logarithms

In Problems 1-10, use properties of logarithms to expand each logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator

1. $\log_3(2 \cdot x)$	2. $\log(100x)$
3. $\ln\left(\frac{e^3}{7}\right)$	4. $\log(x-2)^3$
5. $\log\frac{x^8 y^2}{z^3}$	6. $\log_3\left(\frac{9\sqrt{x}}{y}\right)$
7. $\ln\frac{(x-3)^2\sqrt{x-7}}{4(x+1)^5}$	8. $\ln\sqrt{\frac{x^2 y}{z^3 w^4}}$
9. $\log\sqrt{(x-7)^2(x+3)^{10}}$	10. $\log_5\frac{\sqrt[5]{x-3}(x+5)^2}{25}$

In Problems 11-18, use properties of logarithms to condense each logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions without using a calculator

11. $\log_3 9 + \log_3 9$	12. $\log_4 44 - \log_4 11$
13. $4\log x + 5\log y$	14. $7\log x - 3\log y - 5\log z$
15. $\frac{1}{3}(4\log x - 8\log y)$	16. $7\ln x + \frac{1}{2}\ln y - 2\ln z$
17. $\frac{1}{5}(\log x - 3\log y) - \frac{1}{2}(2\log x - \log y)$	18. $2\ln(x-3) + \ln(x-7) - \ln(x^2-9)$

In Problems 19-20, use common logarithms or natural logarithms and a calculator to evaluate to four decimal places

19. $\log_2 5$	20. $\log_4 17$

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In Problem 21, use a graphing utility and the change-of-base property to graph each function

21. $g(x) = \log_2(x+4)$	