

# Homework

5. Verify your answers to question 4 with a calculator.

6. Solve for  $x$ , to three decimal places.

(a)  $e^x = 16$

(b)  $\ln(x - 1)^2 = 4$

(c)  $e^{2x} = 125$

(d)  $\ln x = 2$

7. Knowledge and Understanding: Find  $\frac{dy}{dx}$  for each function.

(a)  $y = \sqrt{\ln x}$

(b)  $y = \frac{\ln x}{x^3}$

(c)  $y = \ln e^{3x}$

(d)  $y = \ln 6x + \ln 2x$

(e)  $y = x^4 \ln x$

(f)  $y = \frac{\ln 6x}{\ln 2x}$

(g)  $y = \ln 10x^8$

(h)  $y = \ln x + \ln x^2 + \ln x^3 + \ln x^4$

(i)  $y = \ln(8x^2 + 2)^4$

(j)  $y = \sqrt{e} \ln 3$

(k)  $y = \ln 3x^7$

(l)  $y = (e^{2x})(\ln x^3)$

8. Express as a single logarithm.

(a)  $2 \ln x + \ln 2x$

(b)  $3 \ln 4x^2 - 2 \ln x$

(c)  $2 \ln 3x + 3 \ln(2x - 1)$

(d)  $2 \ln x + 3 \ln y$

(e)  $\left(\frac{1}{2}\right) \ln x - \left(\frac{1}{3}\right) \ln y$

(f)  $-5 \ln 2x + 6 \ln x$

9. Show that  $\log e = \frac{1}{\ln 10}$ .

10. Communication: Determine which is greater:  $1 + 3 \ln 2$  or  $\ln 8e$ . Justify your answer.

11. State the domain of each function. Graph the function.

(a)  $y = \ln x + 2$

(b)  $y = \ln(x + 2)$

(c)  $y = \ln x^2$

(d)  $y = 1 - \ln x$

12. Application: Choose a strategy to show that  $\ln x \leq 1 - x$  for  $x \geq 1$ .

13. Find  $\frac{dy}{dx}$  for each function.

(a)  $y = x^3 \ln 2x$

(b)  $y = (\ln 6x)(\ln 2x)$

(c)  $y = \frac{\ln x}{2x^3 - 4}$

(d)  $y = \ln\left(\frac{2x^2 - 3}{2x^3}\right)$

(e)  $y = (x + \ln x)^2$

(f)  $y = \frac{\ln x}{(x + 3)^3}$

(g)  $y = e^{x \ln x}$

(h)  $y = 3\left(\ln \sqrt{2x + 3}\right)^2$

14. Find the equation of the tangent line to the curve  $y = \ln 2x$  at the point where  $x = \frac{e}{2}$ . Graph  $y = \ln 2x$  and this tangent at that point.

15. Graph  $f(x) = \ln x^2$ . Find the equation of the tangent at the point where  $x = 3$ . Graph the tangent and  $f$ .