Derivatives of Logarithmic Functions - Key

In problems 1-11, find the derivative of the function

1. $y'=\frac{5}{x}$	2. $y'=\frac{2x-7}{x^2-7x+1}$
3. $y'=\frac{4}{5(4x-1)}$	4. $y'=3x^2\ln(5x+2)+\frac{5x^3}{5x+2}$ *or* $y'=\frac{x^2\left[15x\ln(5x+2)+6\ln(5x+2)+5x\right]}{5x+2}$
5. $y'=\frac{8}{8x+2}-\frac{7}{7x-1}$ *or* $y'=\frac{-11}{(4x+1)(7x-1)}$	6. $y'=\frac{2}{5x}-\frac{2x}{5(x^2+3)}$ *or* $y'=\frac{6}{5x(x^2+3)}$
7. $y'=\frac{35\left[\ln(7x-1)\right]^4}{7x-1}$	8. $y'=\frac{1}{2x-3}-\frac{1}{x}$ *or* $y'=\frac{-x+3}{x(2x-3)}$
9. $y'=3e^{3x-1}\ln(x^2-5x)+e^{3x-1}\left(\frac{2x-5}{x^2-5x}\right)$ *or* $y'=e^{3x-1}\left[\frac{3(x^2-5x)\ln(x^2-5x)+2x-5}{x^2-5x}\right]$	10. $y'=\frac{3e^{2+3\ln x}}{x}$ *or* $y'=3e^2x^2$
11. $y'=\frac{-4e^x}{1-4e^x}-\frac{4e^x}{1+4e^x}$ *or* $y'=\frac{-8e^x}{(1-4e^x)(1+4e^x)}$	

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In problems 12-14, evaluate the logarithm without using a calculator

12. 5	13. -4
14. 2	

In problems 15-17, use the change-of-base formula and a calculator to evaluate the logarithm (4 decimal places)

15. 1.3181	16. 1.1531
17. -1.2619	

In problems 18-22, find the derivative of the function

18. $y' = (\ln 4)4^x$	19. $y' = \dfrac{1}{x \ln 4}$
20. $y' = 8(\ln 2)2^{8x+1}$	21. $y' = \dfrac{2x+3}{(\ln 7)(x^2+3x)}$
22. $y' = \left(\dfrac{1}{x \ln 3}\right)4^x + (\log_3 x)(\ln 4)4^x$ *or* $y' = 4^x\left[\dfrac{1 + x(\log_3 x)(\ln 4)(\ln 3)}{x \ln 3}\right]$	

In problems 23-24, find an equation of the tangent line to the graph of the function at the given point

23. $y = 2x - 8$	24. $y = 4e^2 x - 3e^3$

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In problems 25-26, find dy/dx implicitly

25. $y' = \frac{3x^2 y + 3y}{y + 3}$	26. $y' = \frac{21x^3 y - y}{x - 4xy^4}$

In problems 27, find an equation of the tangent line to the graph of the function at the given point

27. $y = -12x + 25$	