Derivatives of Logarithmic Functions (Section 3.6) **Version A**
Rensselaer Calculus Skills Practice Page, Fall 2007

No calculators will be allowed and no partial credit will be given.

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1. Differentiate the function $f(t) = -3\,t^2\,\ln(t)$. Express your answer in terms of elementary functions.
2. Differentiate the function $f(t) = -2\,t^{\frac{5}{2}}\,\ln(t)$. Express your answer in terms of elementary functions.
3. Let $f(x) = \dfrac{3\,x^2}{\ln(x)}$. Evaluate $f'(e)$ and express your answer in simplifed form.
4. Differentiate the function $f(t) = \dfrac{\ln(t) - 6}{3 - \ln(t)}$. Express your answer in terms of elementary functions.
5. Let $y = \sin(7\,\ln(x))$. Find $\dfrac{dy}{dx}$ at $x = 1$. Express your answer in simplified form.
6. Let $h(x) = \ln(e^x)$. Evaluate $h'(1)$ and express your answer in simplifed form.
7. Let $y = 2\,\ln(\ln(t) + 3)$. Find $\dfrac{dy}{dt}$. Express your answer in terms of elementary functions.
8. Differentiate the function $f(x) = \dfrac{4}{(\ln(x))^2}$. Express your answer in terms of elementary functions.
9. Let $y = \dfrac{4}{(\ln(x))^{\frac{2}{3}}}$. Find $\dfrac{dy}{dx}$. Express your answer in terms of elementary functions.

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1. $-6\,t\,\ln(t) - 3\,t$
2. $-5\,t^{\frac{3}{2}}\,\ln(t) - 2\,t^{\frac{3}{2}}$
3. $3\,e$
4. $\dfrac{\ln(t) - 6}{t\,(3 - \ln(t))^2} + \dfrac{1}{t\,(3 - \ln(t))}$
5. 7
6. 1
7. $\dfrac{2}{t\,(\ln(t) + 3)}$
8. $-\dfrac{8}{x\,(\ln(x))^3}$
9. $-\dfrac{8}{3\,x\,(\ln(x))^{\frac{5}{3}}}$