Chain Rule **Version A**
Rensselaer Calculus Skills Practice Page

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

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1. Differentiate the function $f(x) = \left(3\,x^2 - 7\,x + 11\right)^3$. Express your answer in terms of elementary functions.
2. Let $y = \left(x^3 + 11\right)^{\frac{2}{3}}$. Find $\dfrac{dy}{dx}$. Express your answer in terms of elementary functions.
3. Let $z = \left(\sin\left(t\right)\right)^2$. Find $\dfrac{dz}{dt}$. Express your answer in terms of elementary functions.
4. Differentiate the function $g(x) = \sqrt{3\,e^{-2\,x} + 2}$. Express your answer in terms of elementary functions.
5. Differentiate the function $f(x) = \dfrac{4}{\left(\ln\left(x\right)\right)^2}$. Express your answer in terms of elementary functions.
6. Let $y = -\dfrac{3}{\left(\ln\left(x\right)\right)^{\frac{2}{3}}}$. Find $\dfrac{dy}{dx}$. Express your answer in terms of elementary functions.
7. Let $y = 2\,\ln\left(\ln\left(t\right) + 2\right)$. Find $\dfrac{dy}{dt}$. Express your answer in terms of elementary functions.
8. Differentiate the function $g(x) = e^{-4\,x}\,\sin\left(2\,x\right)$. Express your answer in terms of elementary functions.

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Answer Key Rensselaer Calculus Skills Practice Page, Fall 2007

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1. $3\,(6\,x-7)\,\left(3\,x^2-7\,x+11\right)^2$
2. $\dfrac{2\,x^2}{\left(x^3+11\right)^{\frac{1}{3}}}$
3. $2\,\cos\left(t\right)\,\sin\left(t\right)$
4. $-\dfrac{3\,e^{-2\,x}}{\sqrt{3\,e^{-2\,x}+2}}$
5. $-\dfrac{8}{x\,\left(\ln\left(x\right)\right)^3}$
6. $\dfrac{2}{x\,\left(\ln\left(x\right)\right)^{\frac{5}{3}}}$
7. $\dfrac{2}{t\,\left(\ln\left(t\right)+2\right)}$
8. $2\,e^{-4\,x}\,\cos\left(2\,x\right)-4\,e^{-4\,x}\,\sin\left(2\,x\right)$