Chain Rule **Version E**
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 $f(x) = \left(3\,x^3 - 7\,x + 9\right)^5$. Express your answer in terms of elementary functions.
2. Let $y = \left(x^3 + 2\right)^{\frac{5}{6}}$. Find $\dfrac{dy}{dx}$. Express your answer in terms of elementary functions.
3. Let $z = \sin\left(t^2\right)$. Find $\dfrac{dz}{dt}$. Express your answer in terms of elementary functions.
4. Differentiate the function $g(x) = \sqrt{3\,e^{3\,x} + 2}$. Express your answer in terms of elementary functions.
5. Differentiate the function $f(x) = -\dfrac{1}{\left(\ln\left(x\right)\right)^4}$. Express your answer in terms of elementary functions.
6. Let $y = \dfrac{2}{\left(\ln\left(x\right)\right)^{\frac{1}{4}}}$. Find $\dfrac{dy}{dx}$. Express your answer in terms of elementary functions.
7. Let $y = -\ln\left(e^t + 5\right)$. Find $\dfrac{dy}{dt}$. Express your answer in terms of elementary functions.
8. Differentiate the function $g(x) = e^{-4\,x}\,\cos\left(4\,x\right)$. 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. $5\left(9x^2-7\right)\left(3x^3-7x+9\right)^4$
2. $\dfrac{5x^2}{2\left(x^3+2\right)^{\frac{1}{6}}}$
3. $2t\cos\left(t^2\right)$
4. $\dfrac{9e^{3x}}{2\sqrt{3e^{3x}+2}}$
5. $\dfrac{4}{x\left(\ln(x)\right)^5}$
6. $-\dfrac{1}{2x\left(\ln(x)\right)^{\frac{5}{4}}}$
7. $-\dfrac{e^t}{e^t+5}$
8. $-4e^{-4x}\sin(4x)-4e^{-4x}\cos(4x)$