Calculus I Fall 2009 **Test 2 (Practice Version)**

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Circle the letter for your final answer. Show your work. Calculators are not allowed.

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1. Given the function $h(z) = \sin(\frac{\pi z}{6})$, find its instantaneous rate of change at $z = 2$.

a) $\underline{\frac{\pi}{12}}$ b) $\frac{\pi}{2}$ c) $\frac{\pi}{6}$ d) $\frac{1}{2}$ e) $\frac{1}{4}$

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2. $f(x) = e^{-2x}$. Find $f''(x)$.

a) $-2xe^{(-2x-1)}$ b) $4x^2e^{(-2x-2)}$ c) $\underline{4e^{-2x}}$ d) e^{-2x} e) $-4e^{-2x}$

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3. $f(x) = \sqrt[3]{x^2+2}$. Find the slope of the normal line to the graph of $f(x)$ at the point $(5, 3)$.

a) $\frac{9}{2}$ b) $-\frac{27}{10}$ c) $\frac{6}{25}$ d) -4 e) $\frac{3}{5}$

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4. Evaluate $g(r) = \frac{1}{2}r^4 - 8r$. Find $g'(2)$.

a) 0 b) 1 c) 8 d) 2 e) 4

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5. Evaluate $\frac{d}{d\theta}[\tan(\theta^2)]$.

a) $\sec^2(\theta)$ b) $\tan(2\theta)$ c) $\sec^2(2\theta)$ d) $2\theta\sec(\theta^2)\tan(\theta^2)$ e) $\underline{2\theta\sec^2(\theta^2)}$

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6. Evaluate $\frac{d}{d\theta}[\tan^2(\theta)]$.

a) $\underline{2\sec^2(\theta)\tan(\theta)}$ b) $2\sec(\theta)\tan^2(\theta)$ c) $\sec^2(2\theta)$ d) $2\theta\sec(\theta^2)\tan(\theta^2)$ e) $\tan(2\theta)$

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7. Find the slope of the line tangent to the curve given by $y^3 + x^3 + xy = 11$ at the point $(2, 1)$.

a) $\frac{5}{7}$ b) $-\frac{13}{5}$ c) -2 d) $-\frac{5}{7}$ e) $\frac{13}{5}$

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8. Find $\lim_{h \to 0} \frac{f(2+h) - f(2)}{h}$ where $f(x) = e^x$.

a) e^2 b) $\frac{0}{0}$ c) e^{2x} d) -2 e) e^x

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9. Find the derivative of $y = \dfrac{x-1}{x^2+1}$.

a) $\dfrac{dy}{dx} = \dfrac{-x^2-2x+1}{(x^2+1)^2}$ b) $\dfrac{dy}{dx} = \dfrac{-x^2+2x-1}{(x^2+1)^2}$

c) $\dfrac{dy}{dx} = \dfrac{x^2-2x+1}{(x^2+1)^2}$ d) $\underline{\dfrac{dy}{dx} = \dfrac{-x^2+2x+1}{(x^2+1)^2}}$ e) $\dfrac{dy}{dx} = \dfrac{x^2-2x-1}{(x^2+1)^2}$

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10. Find $\dfrac{dp}{dt}$ if $p = t^2 \arcsin(t)$.

a) $2t \arccos(t)$ b) $2t \arcsin(t) + t^2 \arccos(t)$

c) $\underline{2t \arcsin(t) + \dfrac{t^2}{\sqrt{1-t^2}}}$ d) $2t \arcsin(t) + \dfrac{t^2}{1+t^2}$ e) $\dfrac{2t}{1+t^2}$

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11. Find y' if $y = \ln\left(\dfrac{(x+1)^3(x-2)^2}{(x+3)}\right)$. (Tip: Use log rules to simplify before differentiating.)

a) $\dfrac{(x+3)}{(x+1)^3(x-2)^2}$ b) $\dfrac{3}{x+1} - \dfrac{2}{x-2} + \dfrac{1}{x+3}$

c) $\underline{\dfrac{3}{x+1} + \dfrac{2}{x-2} - \dfrac{1}{x+3}}$ d) $\dfrac{1}{x+1} - \dfrac{2}{x-2} + \dfrac{3}{x+3}$ e) $\dfrac{1}{6(x+1)^2(x-2)}$

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12. Evaluate $\dfrac{d}{dx}[x^{2x}]$.

a) $\underline{(2\ln(x)+2)x^{2x}}$ b) $2x^{2x}$ c) $2x \cdot x^{2x-1}$ d) $2x\ln(x)$ e) $\dfrac{2}{x}$

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13. Find the equation of the line tangent to the curve $f(x) = x^3 - 7x + \frac{1}{x}$ at $x = 1$.

a) $y = 5x - 10$ b) $\underline{y = -5x}$ c) $y = -\frac{1}{5}x + 1$ d) $y = \frac{1}{5}x + 1$ e) $y = -7x$

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14. The position of an object moving in a straight line is given by the function $p(t) = 3t^3 + t^2 - 5$. What is the object's acceleration when $t = \frac{1}{3}$?

a) 4 b) $\underline{8}$ c) $\frac{1}{3}$ d) -2 e) 0

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15. Solve for $\frac{du}{dv}$ given $u = 2\sin(2v)\cos(2v)$.

a) $-8\cos(2v)\sin(2v)$ b) 4

c) $\underline{4\cos^2(2v) - 4\sin^2(2v)}$ d) $\sin(4v)$ e) $2\sin(2)\cos(2)$

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16. $f(x) = (e^{\sin(x)})^{\ln(x)}$.

a) $e^{(\frac{\cos(x)}{x})}$ b) $\underline{e^{\sin(x)\ln(x)}(\cos(x)\ln(x) + \frac{\sin(x)}{x})}$

c) $\frac{1}{e^{\cos(x)}}$ d) $\frac{1}{\cos(x)e^{\sin(x)}}$ e) $(\cos(x)e^{\sin(x)})^{-1}$
