Math 106-Sec 55X **Gateway Exam** **Name:** _____
Fall 2008 **Recitation Instructor:** _____

Instructions: You need not simplify. Circle your final answer for each problem. No partial credit. Pass is to get 8 right out of 10.

1. (1 point) If $f(x) = x - \sqrt{x} + 5\arcsin x$, then $f'(x)$ is:
   $f'(x) = 1 - \dfrac{1}{2\sqrt{x}} + \dfrac{5}{\sqrt{1-x^2}}$

2. (1 point) If $y = e^{2x^3}\tan(3x)$, then y' is:
   $y' = e^{2x^3}(6x^2)\tan(3x) + e^{2x^3}\sec^2(3x)\cdot 3$

3. (1 point) If $x^2y + xy^2 + \cos x = 5$, then y' is:
   $y' = \dfrac{\sin x - 2xy - y^2}{x^2 + 2xy}$

4. (1 point) If $y = \dfrac{x + \tan x}{\ln(x+5) + x}$, then y' is:
   $y' = \dfrac{(1+\sec^2 x)(\ln(x+5)+x) - (x+\tan x)(\frac{1}{x+5}+1)}{(\ln(x+5)+x)^2}$

5. (1 points) If $y = \ln\left(\dfrac{3x^2+4}{x^2+e^x}\right)$, find $\dfrac{dy}{dx}$.
   $y' = \dfrac{1}{3x^2+4}6x - \dfrac{1}{x^2+e^x}(2x+e^x)$

6. (1 points) If $y = (1+\arctan(6x))^9$, then what is y'?
   $y' = 9(1+\arctan(6x))^8\dfrac{1}{1+(6x)^2}6$

7. (1 points) If $y = x^{-\frac{3}{4}} + 4^{3x}$, then what is $\dfrac{dy}{dx}$?
   $\dfrac{dy}{dx} = -\dfrac{3}{4}x^{-\frac{7}{4}} + 4^{3x}(\ln 4)3$

8. (1 points) If $y = \dfrac{e^3 + x\csc(3x)}{x - \cot x}$, then $\dfrac{dy}{dx}$ is:
   $f'(x) = \dfrac{(\csc(3x) - x\csc(3x)\cot(3x)\cdot 3)(x-\cot x) - (e^3 + x\csc(3x))(1+\csc^2 x)}{(x-\cot x)^2}$

9. (1 points) If $f(x) = [6x + \ln|\ln x|]^3$, then what is $f'(x)$?
   $f'(x) = 3[6x + \ln|\ln x|]^2(6 + \dfrac{1}{\ln x}\dfrac{1}{x})$

10. (1 points) If $y = \sqrt{2x^6 - \sin^{-1} x}$, then y' is:
    $y' = \dfrac{1}{2\sqrt{2x^6 - \sin^{-1} x}}[12x^5 - \dfrac{1}{\sqrt{1-x^2}}]$