

Name: _____

- There are 12 points possible on this proficiency, one point per problem. **No partial credit will be given.**
- You have one hour to complete this proficiency.
- No aids (book, calculator, etc.) are permitted.
- You do **not** need to simplify your expressions.
- You must show sufficient work to justify your final expression. A correct answer for a nontrivial computation with no supporting work will be marked as incorrect.
- Your final answers **must start with** $f'(x) =$, $\frac{dy}{dx} =$, or similar.
- **Draw a box around your final answer.**

1. [12 points] Compute the derivatives of the following functions.

a. $g(x) = e^{3x} \tan(x)$

b. $h(x) = \csc(x^3)$

c. $f(x) = \frac{5}{3x} + \frac{x^2}{\sqrt{5}} - \frac{\pi^2}{3}$

d. $f(x) = x \arcsin(x)$

e. $y = (x^{0.4} + 4)^{-1/5}$

f. $f(t) = \sqrt{t^2 + \cos^2(t)}$

g. $g(x) = \ln(8 + \sin(x^4))$

h. $f(x) = \frac{\sin(\pi x)}{x^3 + x}$

i. $y = e^{(x^2)} + \sec(5x)$

j. $f(x) = \sqrt{2}\cos(1 + e^{-Nx})$ (Assume N is a fixed positive constant.)

k. $j(x) = \frac{x \ln(x) - \sqrt{x}}{x^2}$

l. Find $\frac{dy}{dx}$ for $1 + xy = x^3 + y^2$