

Name: _____

- There are 12 points possible on this proficiency, one point per problem. **No partial credit will be given.**
- You have 1 hour to complete this proficiency.
- No aids (book, calculator, etc.) are permitted.
- You do **not** need to simplify your expressions.
- Correct parenthesization is required.
- Your final answers **must start with** $f'(x) =$, $dy/dx =$, or similar.
- **Circle or box your final answer.**

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

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

b. $g(\theta) = e^{\theta} \tan(\theta)$

c. $h(x) = \csc(x^2)$

d. $y = (x^{0.2} + 3)^{-2/5}$

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

f. $f(x) = x \arctan(x)$

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

h. $y = \ln(5) + e^{x^2} + \sec(9x)$

i. $g(x) = \frac{x^2 + 2}{8} + \ln(8 + \cos(x))$

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

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

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