

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. $f(x) = \frac{1}{3x} + \sqrt{3x}$

b. $f(x) = 4x - x^2 + 2 \tan(x)$

c. $y = \arcsin(x^3)$

d. $f(x) = a^{\sin(x)}$ where a is a constant, $a > 1$

e. $f(x) = \sqrt{x + \ln(2x)}$

f. $f(x) = \sec\left(\frac{x}{x+1}\right)$

g. $f(x) = \sqrt{1+x^2}$

h. $f(x) = \frac{e^x}{\sqrt{x}}$

i. $f(x) = (\ln(x^2 + e^2))^5$

j. $f(x) = \frac{x \ln(x)}{2}$

k. $f(x) = e^{\pi x + 1} + \sqrt{3} \cot(\pi x)$

l. Find $\frac{dy}{dx}$ for $2x + y = \cos(xy)$. You must solve for $\frac{dy}{dx}$.