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. $f(t) = e^t(5 - t^3)$

b. $f(x) = \dfrac{\pi}{\sin x}$

c. $r(\theta) = \cot\left(2\sqrt{3} + \theta^5\right)$

d. $f(r) = \dfrac{r^3 + \sqrt{r} - 8}{r}$

e. $G(x) = \left(\dfrac{x - \ln(3)}{2}\right)^4 - \sqrt{x+3}$

f. $g(z) = (7 - z)(z^3 + 6)$

g. $y(t) = \ln\left(4t + \sin(t^2)\right)$

h. $y = x^{1/3} + e^{-x}\cos(x)$

i. $f(x) = \dfrac{3\sec(ax)}{2x^3}$ (where a is a constant)

j. $f(y) = 5^y + \tan\left(y^{-2}\right)$

k. $g(x) = \arctan(e^{2x})$

l. Compute $\frac{dy}{dx}$ if $\ln y - x^2 y = 2x + 8$. You must solve for $\frac{dy}{dx}$.