

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. $f(t) = e^t(3 - t^4)$

b. $r(\theta) = \tan(\sqrt{3} + \theta^2)$

c. $g(z) = (3z - 4)(z^2 + 7)$

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

e. $f(r) = \frac{r^3 + \sqrt{r} - 2}{r}$

f. $G(x) = \left(\frac{x - \ln(4)}{2} \right)^3$

g. $f(y) = e + \cos(y^\pi)$

h. $f(x) = \frac{2 \sec(bx)}{3x^3}$ (where b is a constant)

i. $y = x^{1/4} e^{-\sin(x)}$

j. $y(t) = \ln(2t + \sin(t^2))$

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

l. Compute $\frac{dy}{dx}$ if $\ln y - 5x = x^2y$. You must solve for $\frac{dy}{dx}$.