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. $f(x) = \dfrac{\sqrt{x}}{3} + \dfrac{5}{\sqrt{x}} - \dfrac{\sqrt{\pi}}{3}$

b. $g(x) = \ln(\sec(x) + \tan(x))$

c. $h(\theta) = \dfrac{\sin(\theta)}{\theta^3}$

d. $y = (\cos(4x) + e^x)^3$

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

f. $r(t) = \dfrac{t^3 - 5t^2 + t^{1/3}}{t}$

g. $f(x) = \sqrt{1+x^a}$ where a is a fixed constant

h. $y = \ln\left(\dfrac{x}{1+2x}\right)$

i. $y = \sin^5(x+e^{-x})$

j. $f(x) = \dfrac{1}{6x^2} + xe^x$

k. $y = \dfrac{1}{\sin(x)}$

l. Find $\dfrac{dy}{dx}$ for $e^y + x^3 = 10 + xy$