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. $f(x) = \dfrac{2x}{3} + \dfrac{2}{3x} - \dfrac{2\pi}{3}$

b. $G(\theta) = \theta^2 \tan(\theta)$

c. $h(x) = \sqrt{x^4 - 16}$

d. $y = \cot(x)$

e. $k(x) = \arcsin(4x)$

f. $R(\theta) = \left(2\theta + \cos\left(\frac{\theta}{\pi}\right)\right)^5$

g. $y = (7x-1)^{-2/3}\ln(x)$

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

i. $f(x) = \left(b^2 + \ln(bx^2+1)\right)^{7.8}$ (Assume b is a fixed constant.)

j. $y = \dfrac{5e^x}{x - e^x}$

k. $f(x) = x\left(\dfrac{2x - x^{-2}}{3x^2}\right)$

l. Find $\dfrac{dy}{dx}$ for $\sin(y^2) = x + y + \sqrt{2}$.