Math 251: Derivative Proficiency   **March 3, 2022**

Name: ───────────────────────────────────

- There are 12 points possible on this proficiency, one point per problem. **No partial credit will be given.**

- A passing score is 10/12.

- You have 30 minutes to complete this proficiency.

- No aids (book, calculator, etc.) are permitted.

- You do **not** need to simplify your expressions.

- 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. $f(x) = \dfrac{\sqrt{x}}{4} + \dfrac{5}{\sqrt{x}} - \dfrac{6}{\sqrt{5}}$

b. $f(x) = (\ln(x))(\tan(x))$

c. $y = 5\sec(5x)$

d. $f(x) = \dfrac{\cos(x)}{\sin(x)}$

e. $f(x) = 3\sin^{-1}(3x)$

f. $f(x) = (x + 5^x + e^5)^3$

g. $y = \left(x^{0.2} + 1\right)^{-2/3}$

h. $f(x) = \dfrac{\sin(\pi/x)}{x^4 + 4}$

i. $y = e^{-x} + x^2 e^{2x}$

j. $f(x) = \ln\left(\dfrac{\sin^2(3x)}{2x+1}\right)$

k. $f(x) = \dfrac{\cos(2)}{\sqrt[3]{\cos(x)}}$

l. Find $\dfrac{dy}{dx}$ for $xe^y + 5(x^2 + y^2) = 0$. You must solve for $\dfrac{dy}{dx}$.