

Name: _____ Class (circle): Sync. Online

- 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 60 minutes 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 non-trivial computation with no supporting work will be marked as incorrect.
- 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. $f(x) = x^{2/3} + x^{-2} + \pi^2$

b. $r(\theta) = \frac{2}{\cos \theta}$

c. $h(t) = (2t^3 - t)(4 + 8t)$

d. $g(x) = e^{2x} \ln(x) \cos(x)$

e. $w(r) = (r^3 - 1) \cdot \arcsin(r^2)$

f. $y = \frac{e^{-x}}{2 + \sin(bx)}$, where b is a fixed constant

g. $k(x) = \frac{xe^x}{1+x}$

h. $f(x) = \ln(\sqrt{2} + \sec(x))$

i. $y = \left(\frac{1}{x} + \frac{5x^3}{2}\right)^5$

j. $s(t) = \sin\left(\sqrt{t+t^4}\right)$

k. $g(\theta) = \tan\left(\frac{2}{\theta^3} + e\right)$

l. Compute dy/dx if $x^2y - e^x = 2 + \cos(y)$. You must solve for dy/dx .