Name: Key **Date** _____

Instructions: For each question, neatly write a solution and circle your answer.

1. If $f(x) = \sqrt{x} + 4x^3 - 11x^2 + 9x - 21 - \frac{1}{x^3} + 2x^{3/2}$, what is $f'(x)$?

$f(x) = x^{\frac{1}{2}} + 4x^3 - 11x^2 + 9x - 21 - x^{-3} + 2x^{\frac{3}{2}}$

$f'(x) = \frac{1}{2}x^{-\frac{1}{2}} + 12x^2 - 22x + 9 + 3x^{-4} + 3x^{\frac{1}{2}}$

$f'(x) = \frac{1}{2\sqrt{x}} + 12x^2 - 22x + 9 + \frac{3}{x^4} + 3\sqrt{x}$

2. If $g(x) = \frac{3x^2 + 12x - 1}{x - 2}$, what is $g'(x)$?

$g'(x) = \frac{(x-2)(6x+12) - (3x^2 + 12x - 1)}{(x-2)^2}$

3. Find the first and second derivatives for $h(x) = (x - 1)(x^2 + e^x)$.

$h'(x) = (x-1)(2x + e^x) + (x^2 + e^x)$

$h''(x) = (x-1)(2 + e^x) + (2x + e^x) + (2x + e^x)$

OR

$h(x) = x^3 + xe^x - x^2 - e^x$

$h'(x) = 3x^2 + xe^x + e^x - 2x - e^x = 3x^2 + xe^x - 2x$

$h''(x) = 6x + xe^x + e^x + e^x - 2 - e^x = 6x + xe^x + e^x - 2$