MAT 136 (Calculus I), Prof. Jim Swift
In-Class Worksheet: Derivative Shortcuts 1.

For each of these functions, fill in the blank with the derivative *if* you can do so using the rules we have learned so far in this class, possibly after an algebraic manipulation of the expression. Otherwise, write "Can't do yet."

Let $f(x) = x^2 - 3x + 4$. $f'(x) =$ $2x - 3$

Let $y = x^{-3} - 1$. $\frac{dy}{dx} =$ $-3x^{-3-1} - 0 = \boxed{-3x^{-4}}$

$\frac{d}{dx}\left(x^{\frac{1}{2}} - 2x + 1\right) =$ $\frac{1}{2}x^{\frac{1}{2}-1} - 2 = \boxed{\frac{1}{2}x^{-\frac{1}{2}} - 2}$

Let $f(x) = x^2 + x - 4$. $f'(x) = 2x + 1$

$f'(3) =$ $2 \cdot 3 + 1 = 7$

Let $f(x) = \frac{x^2 - 1}{x} = \frac{x^2}{x} + \frac{-1}{x} = x - x^{-1}$

$f'(x) =$ $1 - (-1)x^{-1-1} = \boxed{1 + x^{-2}}$

Let $f(x) = \frac{x}{x^2 - 1}$. $f'(x) =$ Can't do yet. Note: $\frac{x}{x^2-1} \neq \frac{x}{x^2} - \frac{x}{1}$

$\frac{d}{dx}\left(\sqrt{x}(x^2 - 1)\right) = \frac{d}{dx}\left(x^{\frac{1}{2}}(x^2 - 1)\right) = \frac{d}{dx}\left(x^{\frac{5}{2}} - x^{\frac{1}{2}}\right) = \frac{5}{2}x^{\frac{3}{2}} + \frac{1}{2}x^{-\frac{1}{2}}$

$\frac{d}{dx}\left(\frac{\sqrt{x}}{x^2 - 1}\right) =$ Can't do yet.
