Example 1: Find the derivative of $f(x) = \sqrt{x^3}$
This can be rewritten as

$$f(x) = x^{1.5}$$

which fits into derivative form #2:

$$\begin{aligned}
f(x) &= x^{1.5} \\
f'(x) &= 1.5 * x^{1.5-1}\frac{dx}{dx} \\
f'(x) &= 1.5x^{.5} \\
f'(x) &= 1.5\sqrt{x}
\end{aligned}$$

Example 2: Find the derivative of $f(x) = \ln(x^2 + 2x + 1)$
This can be rewritten using rules of logarithms as:

$$\begin{aligned}
f(x) &= \ln(x^2 + 2x + 1) \\
f(x) &= \ln\left((x+1)^2\right) \\
f(x) &= 2\ln(x+1) \\
f'(x) &= 2 * \frac{1}{x+1}\frac{dx}{dx} \\
f'(x) &= \frac{2}{x+1}
\end{aligned}$$

Example 3: Find the derivative of $f(x) = \sin\left(\frac{\cos(x)}{x^2+1}\right)$
This will require the chain rule (twice) and the product rule. First, let's do the chain rule:

$$\begin{aligned}
f(x) = &\sin\left(\frac{\cos(x)}{x^2+1}\right) \\
&\cos\left(\frac{\cos(x)}{x^2+1}\right) * \frac{d}{dx}\left(\frac{\cos(x)}{x^2+1}\right)
\end{aligned}$$

Now we have to find the still unfinished part:

$$\begin{aligned}
&\cos\left(\frac{\cos(x)}{x^2+1}\right) * \frac{d}{dx}\left(\frac{\cos(x)}{x^2+1}\right)\\
&\cos\left(\frac{\cos(x)}{x^2+1}\right) * \frac{d}{dx}\left(\cos(x)(x^2+1)^{-1}\right)\\
&\cos\left(\frac{\cos(x)}{x^2+1}\right) * \left(\cos(x) * \frac{d}{dx}\left((x^2+1)^{-1}\right) + (-\sin(x)) * (x^2+1)^{-1}\right)\\
&\cos\left(\frac{\cos(x)}{x^2+1}\right) * \left(\cos(x) * -(x^2+1)^{-2} * 2x\right) - \sin(x) * (x^2+1)^{-1}\right)\\
&\cos\left(\frac{\cos(x)}{x^2+1}\right) * \left(\frac{2x\cos(x)}{(x^2+1)^2} - \frac{\sin(x)}{x^2+1}\right)\\
&\cos\left(\frac{\cos(x)}{x^2+1}\right) * \left(\frac{2x\cos(x)}{(x^2+1)^2} - \frac{\sin(x)(x^2+1)}{(x^2+1)^2}\right)\\
&\cos\left(\frac{\cos(x)}{x^2+1}\right) * \left(\frac{2x\cos(x) - \sin(x)(x^2+1)}{(x^2+1)^2}\right)\\
f'(x) = &\cos\left(\frac{\cos(x)}{x^2+1}\right) * \frac{2x\cos(x) - \sin(x)(x^2+1)}{(x^2+1)^2}
\end{aligned}$$

It's not pretty but Calculus rarely is.