Calculus I
Derivatives of square root expressions

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$$
\begin{aligned}
(g(h(x)))' &= g'(h(x)) \cdot h'(x) && && \text{(notation 1)} \\
(g(u))' &= g'(u)u' && \text{where } u = h(x) && \text{(notation 2)} \\
\frac{\mathrm{d}y}{\mathrm{d}x} &= \frac{\mathrm{d}y}{\mathrm{d}u}\frac{\mathrm{d}u}{\mathrm{d}x} && \text{where } y = g(u) && \text{(notation 3)} \quad .
\end{aligned}
$$

Example (Chain Rule, Notation 2)

$$
\begin{aligned}
\text{Differentiate} \quad f(x) &= \sqrt{x^2+1}. \\
\text{Let} \quad u &= \\
\text{Let} \quad g(u) &= \\
\text{Then} \quad f(x) &= g(u). \\
\text{Chain Rule:} \quad f'(x) &= g'(u)u'
\end{aligned}
$$