$$\frac{d}{dx}[\ln u] = \frac{u'}{u}$$

① $\ln|\sec x - \tan x|$

$$y' = \frac{\sec x \tan x - \sec^2 x}{\sec x - \tan x}$$

$$y' = \frac{\sec x(\tan x - \sec x)}{\sec x - \tan x}$$

$$y' = \frac{-\sec x(\sec x - \tan x)}{\sec x - \tan x}$$

$$y' = -\sec x$$

$$y'' = -\sec x \tan x$$

* sec ⇒ secxtanx
* tan ⇒ $\sec^2 x$
* csc ⇒ cscxcotx
* cot x ⇒ $\csc^2 x$

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4. $2xy^3 - 5x + 3y - 6 = 0$

$$2x(3y^2y') + 2y^3 - 5 + 3y' = 0$$

$$6xy^2y' + 3y' = -2y^3 + 5$$

$$y'(6xy^2 + 3) = -2y^3 + 5$$

$$y' = \frac{-2y^3 + 5}{6xy^2 + 3}$$

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(5) $y = \frac{1}{2}e^{\sin 2x}$ $(0, \frac{1}{2})$

$y' = \frac{1}{2} \cdot 2(\cos 2x)e^{\sin 2x}$ $\quad * e^u \quad u' e^u$

$y' = \cos 2x \, e^{\sin 2x}$

$y' = \cos 2(0) e^{\sin(2)(0)}$

$y' = 1(e^0)$ $\quad y = x + \frac{1}{2}$

$y' = 1$

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6. $y = \sqrt{\frac{x^2-1}{x^2+1}}$

$\ln y = \frac{1}{2}\ln(x^2-1) - \frac{1}{2}\ln(x^2+1)$

$\frac{y'}{y} = \frac{1(2x)}{2(x^2-1)} - \frac{1(2x)}{2(x^2+1)}$

$y' = y\left[\frac{2x(x^2+1) - 2x(x^2-1)}{2(x^2-1)(x^2+1)}\right]$

$y' = \frac{(x^2-1)^{1/2}}{(x^2+1)^{1/2}}\left[\frac{2x^3+2x-2x^3+2x}{2(x^2-1)(x^2+1)}\right]$

$y' = \frac{2x}{(x^2-1)^{1/2}(x^2+1)^{3/2}}$

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Quiz

(2) $\ln(x^2-7)^{1/2}$

$\frac{1}{2}\ln(x^2-7)$

$\frac{\frac{1}{2}(2x)}{\frac{1}{2}(x^2-7)} = \frac{1}{x^2-7}$

(5) $y = \ln(\ln x^{13})$

$y' = \frac{\frac{13x^2}{x^{13}}}{\ln x^{13}}$

$y' = \frac{13}{x \ln x^{13}}$

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