Warm Up:

What is the product rule?

(first)(second)' + (second)(first)'

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Quotient Rule

$$y = \frac{f(x)}{g(x)}$$

$$\frac{dy}{dx} = \frac{g(x)f'(x) - f(x)g'(x)}{g^2(x)}$$

" $\frac{\text{low d high} - \text{hi d low}}{\text{low low}}$ "

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② (e) $f(x) = \tan(x)$

$$f(x) = \frac{\sin(x)}{\cos(x)}$$

$$f'(x) = \frac{\cos(x)\cos(x) - \sin(x)(-\sin(x))}{\cos^2(x)}$$

$$= \frac{\cos^2(x) + \sin^2(x)}{\cos^2(x)}$$

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

$$= \sec^2(x)$$

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② (d) $f(x) = \frac{1+\ln x}{x}$, $x \neq 0$

$$f'(x) = \frac{(x)\left(\frac{1}{x}\right) - (1+\ln x)(1)}{x^2}$$

$$= \frac{1 - 1 - \ln x}{x^2}$$

$$= \frac{-\ln x}{x^2}$$

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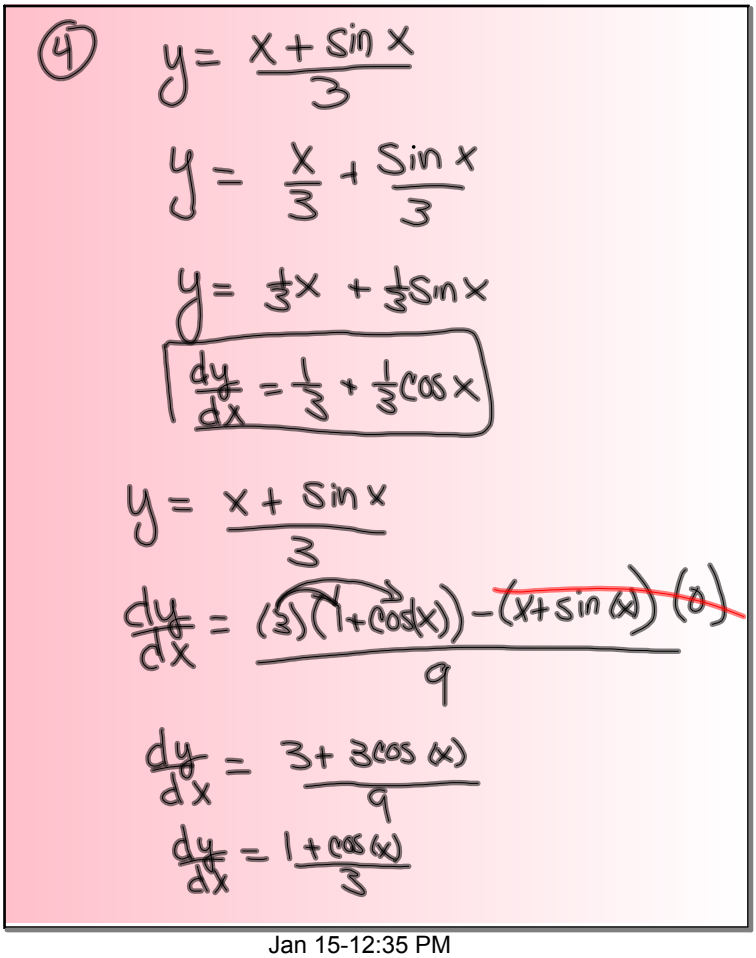

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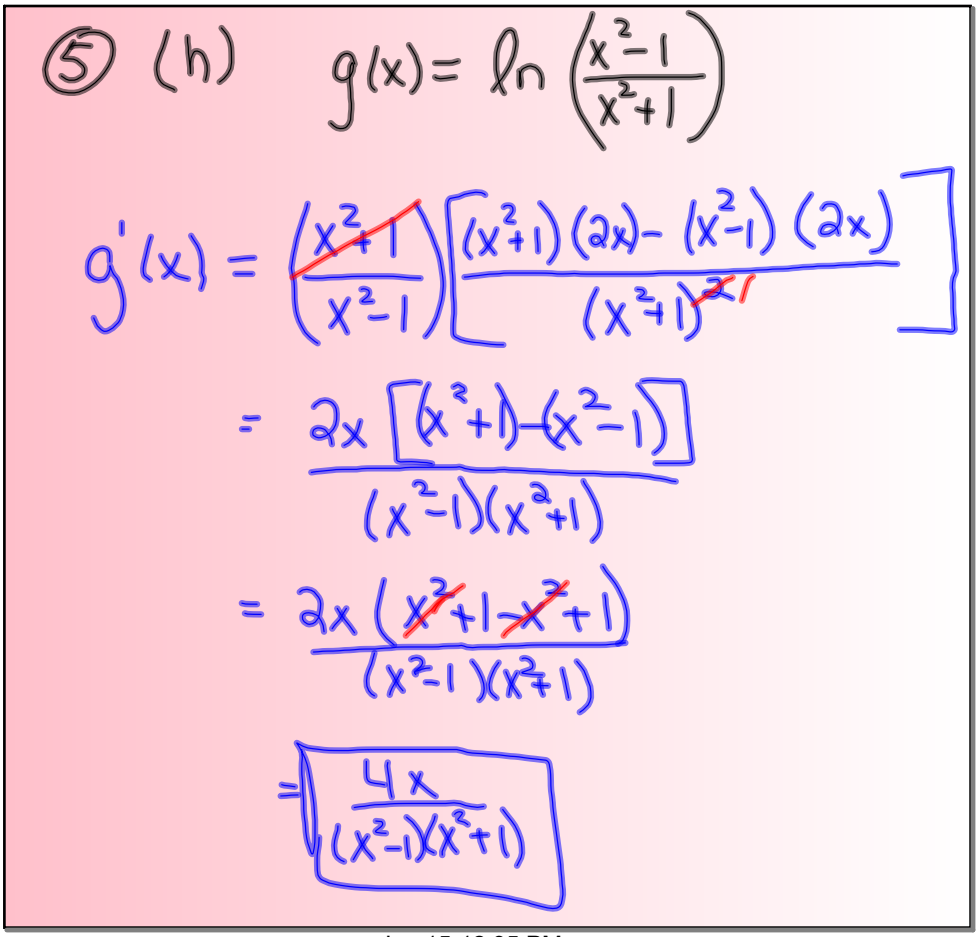

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(i) $y = \frac{e^{2x}}{1+3x}$

$$\frac{dy}{dx} = \frac{(1-3x)(e^{(2x)})(2) - (e^{2x})(-3)}{(1-3x)^2}$$

$$= \frac{2e^{2x}(1-3x) + 3e^{2x}}{(1-3x)^2}$$

$$= \frac{2e^{2x} - 6xe^{2x} + 3e^{2x}}{(1-3x)^2}$$

$$= \frac{5e^{2x} - 6xe^{2x}}{(1-3x)^2}$$

$$= \boxed{\frac{e^{2x}(5-6x)}{(1-3x)^2}}$$

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(5) (k) $y = 2\tan(3x)$

$$\frac{dy}{dx} = 2\sec^2(3x)(3)$$

$$= 6\sec^2(3x)$$

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$y = ax^n$	$\frac{dy}{dx} = anx^{n-1}$
$y = e^u$	$\frac{dy}{dx} = e^u du$
$y = \ln u$	$\frac{dy}{dx} = \frac{1}{u} \cdot du$
$y = \sin u$	$\frac{dy}{dx} = \cos u \cdot du$
$y = \cos u$	$\frac{dy}{dx} = -\sin u \cdot du$
$y = \tan u$	$\frac{du}{dx} = \sec^2 u \cdot du$
$y = \cot u$	$\frac{du}{dx} = -\csc^2 u \cdot du$

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