1. Which of the following could be used to find the slope of the line tangent to the curve $\tan^{-1}(x-2y+2) = x^2 - 3y + \tan^{-1}(2) - 1$?

$$\frac{d}{dx}[\sin^{-1} u] = \frac{1}{\sqrt{1-u^2}} \cdot \frac{du}{dx}$$

$$\frac{d}{dx}[\cos^{-1} u] = \frac{-1}{\sqrt{1-u^2}} \cdot \frac{du}{dx}$$

$$\frac{d}{dx}[\tan^{-1} u] = \frac{1}{1+u^2} \cdot \frac{du}{dx}$$

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

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

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

(D) $\frac{1-2\frac{dy}{dx}}{1+(x-2y+2)} = 2x - 3\frac{dy}{dx}$

$\frac{1}{1+2^2} \cdot 0$

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

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

2.

x	3	6
$f(x)$	4	5
$f'(x)$	$\frac{1}{3}$	$\frac{3}{4}$

The table above gives selected values for a differentiable and increasing function f and its derivative. Let g be the increasing function given by $g(x) = f(x) + f(2x)$, where $g(3) = f(3) + f(6) = 9$. Which of the following describes a correct process for finding $(g^{-1})'(9)$?

(A) $(g^{-1})'(9) = \frac{1}{g'(g^{-1}(9))} = \frac{1}{g'(3)}$ and $g'(3) = f'(3) + 2f'(6)$

(B) $(g^{-1})'(9) = \frac{1}{g'(g^{-1}(9))} = \frac{1}{g'(3)}$ and $g'(3) = f'(3) + f'(6)$

(C) $(g^{-1})'(9) = g'(g^{-1}(9)) = g'(3)$ and $g'(3) = f'(3) + f'(6)$

(D) $(g^{-1})'(9) = g'(g^{-1}(9)) = g'(3)$ and $g'(3) = f'(3) + 2f'(6)$

1) Set up derivative of inverse

$$\boxed{(g^{-1})'(9) = \frac{1}{g'(g^{-1}(9))} = \frac{1}{g'(3)}}$$

2) Find the derivative function of $g(x)$

$g(x) = f(x) + f(2x)$

$g'(x) = \underline{f'(2x) \cdot 2}$ ← Der. of $2x$

$g'(x) = f'(x) + 2f'(2x)$ combine

3) evaluate $g'(x)$ at 3

$g'(3) = f'(3) + 2f'(2 \cdot 3)$

$$\boxed{g'(3) = f'(3) + 2f'(6)}$$

3. Which of the following does not require the use of the chain rule to find $\frac{dy}{dx}$?

(A) $y = \sin^{-1}(3x^2 - 4)$

(B) $3x^6 - 4y^2 = 2xy^5 + 7$

(C) $y = 3x^2 - \sqrt{x} + \frac{2}{x}$ ✓

(D) $\cos(x + y) + 2^y - x = 0$

* can evaluate using only the power rule