

C12 - 2.12 - Functions/Inverse Derivative Notes

$y = f(x)$	$y = f(x^3)$	$y = f^2(x)$	$y = f^3(2x)$
$y' = f'(x) \times 1$	$y' = f'(x^3) \times 3x^2$	$y = (f(x))^2$	$y = (f(2x))^3$
$y = f(\text{that})$		$y' = 2(f(x))^1 f'(x)$	$y' = 3(f(2x))^2 f'(2x) \times 2$
$y' = f'(\text{that}) \times (\text{chain that})$		$y' = 2f(x)f'(x)$	$y' = 6f^2(2x)f'(2x)$

$y = \sqrt{f(x)}$	$y = e^{f(x)}$
$y = (f(x))^{\frac{1}{2}}$	$y' = e^{f(x)} f'(x)$
$y' = \frac{1}{2} f'(x)^{-\frac{1}{2}} \times f'(x)$	
$y' = \frac{f'(x)}{2\sqrt{f(x)}}$	

Find $(f^{-1})'(x)$ of $f(x) = x^3 + 1$, @ $y = 9$.

$(f^{-1})'(x) = \frac{1}{f'(f^{-1}(x))}$	$f(x) = x^3 + 1$	$f^{-1}(x) = \sqrt[3]{x - 1}$
	$y = x^3 + 1$	
	$x = y^3 + 1$	$f^{-1}(x) = (x - 1)^{\frac{1}{3}}$
$(f^{-1})'(x) = \frac{1}{3(x - 1)^{\frac{2}{3}}}$	$y = \sqrt[3]{x - 1}$	$f^{-1}(x) = \frac{1}{3}(x - 1)^{-\frac{2}{3}}$
$(f^{-1})'(9) = \frac{1}{3(9 - 1)^{\frac{2}{3}}}$	$f^{-1}(x) = \sqrt[3]{x - 1}$	$(f^{-1})'(x) = \frac{1}{3(x - 1)^{\frac{2}{3}}}$
$(f^{-1})'(9) = \frac{1}{12}$		

$f(x) = x^3 + 1$	$y = x^3 + 1$
$f'(x) = 3x^2$	$9 = x^3 + 1$
$f'(2) = 3(2)^2$	$x = 2$
$f'(2) = 12$	$(2, 9)$
$(f^{-1})'(x) = \frac{1}{f'(f^{-1}(x))}$	
$(f^{-1})'(x) = \frac{1}{f'(2)} = \frac{1}{12}$	