Use the function and the given real number to find $(f^{-1})'(a)$

1a) $f(x) = \frac{1}{4}x^3 + x - 1$, $a = 3$

$$(f^{-1})'(3) = \frac{1}{f'(2)} = \frac{1}{\frac{3}{4}(2^2) + 1} = \frac{1}{4}$$

Using the calculator, we know that $x = 2$ when $y = 3$. So, $f(2) = 3$ and $(f^{-1})(3) = 2$

$$(f^{-1})'(3) = \frac{1}{f'(f^{-1}(3))} = \frac{1}{f'(2)}$$

1b) $f(x) = x^3 + 2x - 1$, $a = 2$

1c) $f(x) = \sin x$, $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$, $a = \frac{1}{2}$

1d) $f(x) = \frac{x + 6}{x - 2}$, $x > 2$, $a = 3$

Given $f \circ g(x) = x$, use implicit differentiation to find *derivative* of $g(x)$ at the given point.

2a) $f(x) = x^3 - 7x^2 + 2$ and $g(-4) = 1$

$$x = y^3 - 7y^2 + 2$$

$$1 = 3y^2\frac{dy}{dx} - 14y\frac{dy}{dx}$$

$$\frac{dy}{dx} = \frac{1}{3y^2 - 14y}$$

At $(-4, 1)$, $\frac{dy}{dx} = \frac{1}{3 - 14} = \frac{-1}{11}$

2b) $f(x) = 2\ln(x^2 - 3)$ and $g(0) = 2$

3a) The function f is defined by $f(x) = x^3 + 4x + 2$. If g is the inverse function of f and $g(2) = 0$, what is the value of $g'(2)$?

(A) $-\frac{1}{16}$ (B) $-\frac{4}{81}$ (C) $\frac{1}{4}$ (D) 4