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

1a) $f(x) = x^3 - 7x^2 + 2$ 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 $(-4, 1)$, $\frac{dy}{dx} = \frac{1}{3 - 14} = \frac{-1}{11}$

1b) $f(x) = 2\ln(x^2 - 3)$ and $g(0) = 2$

2) AP MULTIPLE CHOICE EXAMPLES

1) If the function f is defined by $f(x) = x^5 - 1$, then f^{-1}, the inverse function of f, is defined by $f^{-1}(x) =$

(A) $\frac{1}{\sqrt[5]{x}+1}$ (B) $\frac{1}{\sqrt[5]{x+1}}$ (C) $\sqrt[5]{x-1}$

(D) $\sqrt[5]{x} - 1$ (E) $\sqrt[5]{x+1}$

2) Let f and g be functions that are differentiable everywhere. If g is the inverse function of f and if $g(-2) = 5$ and $f'(5) = -\frac{1}{2}$, then $g'(-2) =$

(A) 2 (B) $\frac{1}{2}$ (C) $\frac{1}{5}$ (D) $-\frac{1}{5}$ (E) -2

3) 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

4) If $f(x) = \sin x$, then $(f^{-1})'(\frac{\sqrt{3}}{2}) =$

(A) $\frac{1}{2}$ (B) $\frac{2\sqrt{3}}{3}$ (C) $\sqrt{3}$ (D) 2