

$$f'(x) = 3x^2 + 4$$

ntiation of Inverse Functions

Critical Homework Answers

$$g'(2) = \frac{1}{f'(0)} \quad a = 2$$

$$= \frac{1}{4}$$

$$(f^{-1})'(2) = \frac{1}{f'(f^{-1}(2))} = \frac{1}{f'(1)} = \frac{1}{3(1^2) + 2} = \frac{1}{5}$$

$$1c) \quad f'(x) = \cos x > 0 \text{ on } \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$$

$$f\left(\frac{\pi}{6}\right) = \sin \frac{\pi}{6} = \frac{1}{2} \Rightarrow f^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{6}$$

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

$$= \frac{1}{f'\left(\frac{\pi}{6}\right)} = \frac{1}{\cos\left(\frac{\pi}{6}\right)} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$1d) \quad f(x) = \frac{x+6}{x-2}, \quad x > 0, a = 3$$

$$f'(x) = \frac{(x-2)(1) - (x+6)(1)}{(x-2)^2}$$

$$= \frac{-8}{(x-2)^2}$$

$$f(6) = 3 \Rightarrow f^{-1}(3) = 6$$

$$(f^{-1})'(3) = \frac{1}{f'(f^{-1}(3))} = \frac{1}{f'(6)} = \frac{1}{-8/(6-2)^2} = -2$$

$$2b) \quad x = 2 \ln(y^2 - 3)$$

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

$$\frac{dy}{dx} = \frac{y^2 - 3}{4y}$$

$$\frac{dy}{dx}(0, 2) = \frac{1}{8}$$

3a) If (2, 0) is on g(x) then (0, 2) is on f(x).

$$f'(x) = 3x^2 + 4$$

$$g'(2) = \frac{1}{f'(0)}$$

$$= \frac{1}{4}$$