Quiz #6

Name: Solutions

Math 130, Section 21, David Beydler

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Directions: Show all work to get full credit. No calculators, books, notes. Please box your answers. Good luck!

(15 points total)

1. (1 point) Is the following function one-to-one? Be sure to show your work.

$f(x) = y = 2x^3 - 1$

Suppose $f(a) = f(b)$. Then...

$2a^3 - 1 = 2b^3 - 1$

$2a^3 = 2b^3$

$a^3 = b^3$

$a = b$

Yes

2. (3 points) Use the definition of inverses to determine whether f and g are inverses. Be sure to show your work.

$f(x) = \frac{x+1}{x-2}$ and $g(x) = \frac{2x+1}{x-1}$

$f(g(x)) = f\left(\frac{2x+1}{x-1}\right)$

$= \dfrac{\frac{2x+1}{x-1} + 1}{\frac{2x+1}{x-1} - 2}$

$= \dfrac{2x+1+x-1}{2x+1-2(x-1)}$

$= \dfrac{3x}{3} = x$

$g(f(x)) = g\left(\frac{x+1}{x-2}\right)$

$= \dfrac{2\left(\frac{x+1}{x-2}\right)+1}{\frac{x+1}{x-2} - 1}$

$= \dfrac{2(x+1)+x-2}{x+1-(x-2)}$

$= \dfrac{3x}{3}$

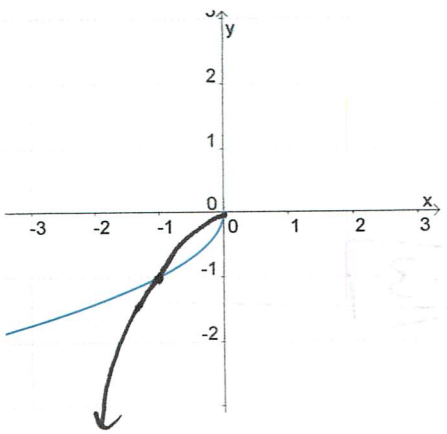
$= x$

So, yes f and g are inverses.

3. (2 points) Find the inverse of the following function: $\{(-3, 6), (2, 1), (5, 8)\}$

$\{(6, -3), (1, 2), (8, 5)\}$

4. (1 point) Graph the inverse of the following one-to-one function.



5. Let $f(x) = x^3 + 1$.

a. (2 points) Write an equation for the inverse function in the form $y = f^{-1}(x)$.

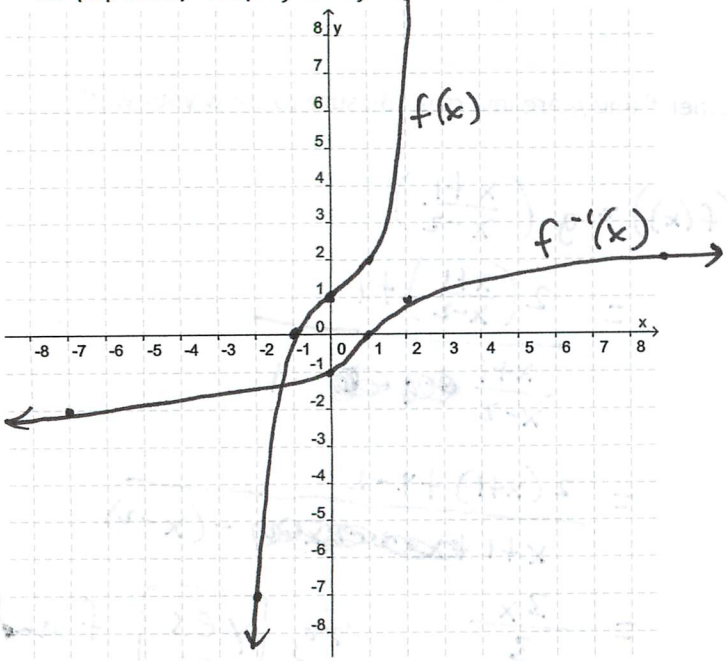
$y = x^3 + 1$ ← switch x and y

$x = y^3 + 1$

$x - 1 = y^3$

$\sqrt[3]{x-1} = y$ → $f^{-1}(x) = \sqrt[3]{x-1}$

b. (2 points) Graph f and f^{-1} on the same axes.



c. (2 points) Give the domain and range of f and f^{-1}.

Domain of f: $(-\infty, \infty)$ → Domain of f^{-1}: $(-\infty, \infty)$

Range of f: $(-\infty, \infty)$ → Range of f^{-1}: $(-\infty, \infty)$

6. (1 point) True or false: If $f(x) = x^2$, then $f^{-1}(x) = \sqrt{x}$. False

Not one-to-one

7. (1 point) If a function f has an inverse and $f(-3) = 6$, then $f^{-1}(6) =$ -3