COLLEGE ALGEBRA

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GPS # 22 2.7 INVERSE FUNCTIONS II

Class Time: 11:30 A.M. Date: 2/19/08

Useful Guidelines:

* **One-to-one function:** A function whose inverse is also a function. [If $x_1 \neq x_2$, then $f(x_1) \neq f(x_2)$]
* Horizontal-line test: If every horizontal line intersects the graph of *f* in at most one point, then *f* is one-to-one.
* The graph of a function *f* and its inverse f^{-1} (read as *f* inverse) are symmetric with respect to the line $y = x$.
* To find the inverse, $f^{-1}(x)$, of a one-to-one function:
  (1) Let $y = f(x)$
  (2) Swap the variables x and y
  (3) Solve for y and replace y by $f^{-1}(x)$
  (4) Check the result by showing that $f^{-1}(f(x)) = x$ and $f(f^{-1}(x)) = x$
* To find the range of a one-to-one function *f*, find the domain of the inverse function f^{-1}.
  [Domain of *f* = Range of f^{-1}; Range of *f* = Domain of f^{-1}.]

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1. Given $f(x) = 50x$ and $g(x) = \frac{x}{50}$, find the following:

a) $f(g(x))$ $= f\left(\frac{x}{50}\right) = \cancel{50}\left(\frac{x}{\cancel{50}}\right) = x$

b) $g(f(x))$ $= g(50x) = \frac{\cancel{50}x}{\cancel{50}} = x$

Determine whether the pair of functions *f* and *g* are inverses of each other.

?

2. If $f(x) = 50x^3 - 18$ and $g(x) = \sqrt[3]{\frac{x+18}{50}}$, find the following:

a) $f(g(x))$ $f\left(\sqrt[3]{\frac{x+18}{50}}\right) = 50\left(\sqrt[3]{\frac{x+18}{50}}\right)^3 = \cancel{50}\,\frac{x+18}{\cancel{50}} - 18 = x$

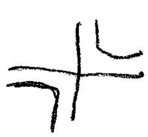
b) $g(f(x))$ $g(50x^3 - 18) = \sqrt[3]{\frac{(50x)^3 - 18) + 18}{50}} =$

Determine whether *f(x)* and *g(x)* are inverse functions.

?

3. Determine the function is one-to-one. If it is one-to-one, find a formula for its inverse and check the result by showing that $f^{-1}(f(x)) = x$ and $f(f^{-1}(x)) = x$

$f(x) = \frac{7}{x}$



$f^{-1}(x) = f\left(\frac{7}{x}\right) = \frac{7}{\frac{7}{x}} = x$

yes one-to-one

1. Let $y = \frac{7}{x}$
2. swap $x = \frac{7}{y}$
3. Solve y: $y = \frac{7}{x}$
4. Replace y with $f^{-1}(x)$
   $f^{-1}(x) = \frac{7}{x}$