COLLEGE ALGEBRA

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GPS # 22 **2.7 INVERSE FUNCTIONS II** Class Time: 11:30-12:45 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}.]

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

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

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

$g(f(x)) = f(g(x))$
$f(g(x)) = g(f(x))$
> Inverses of each other

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

Yes, they are inverses of each other

Both = x

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

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

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

$g(f(x)) = f(g(x))$
$f(g(x)) = g(f(x))$
> Inverses of each other

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

Yes, they are inverses of each other

Both = x

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 $f(f^{-1}(x)) = x$

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

it is a function, its a one-to-one function

1. $y = \frac{7}{x}$ 3. $y = \frac{7}{x}$

2. $x = \frac{7}{y}$ 4. $f^{-1}(x) = \frac{7}{x}$

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

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

They are inverse functions of each other