

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} .]

*v. good
no hb!*

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

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

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

Since $g(f(x)) = x$ and $f(g(x)) = x$, they are inverses of each other.
 Determine whether the pair of functions f and g are inverses of each other.

→ Since $g(f(x)) = x$ and $f(g(x)) = x$,
 they 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) $f(g(x)) = f\left(\sqrt[3]{\frac{x+18}{50}}\right) = 50\left(\sqrt[3]{\frac{x+18}{50}}\right)^3 - 18 = x \checkmark$

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

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

~~They are equal~~, so they are
 inverses of each other.

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

$f(x) = \frac{7}{x}$ Reciprocal function \checkmark HLT \checkmark one-to-one

① $y = \frac{7}{x}$

② $x = \frac{7}{y}$

③ $y = \frac{7}{x}$

④ $f^{-1}(x) = \frac{7}{x}$

they are inverses of each other.

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

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

v. good!