Verifying Inverses

To prove f(x) and g(x) are inverses, you must show that

$$f(g(x)) = g(f(x)) = x$$

You must show only ONE mathematical step at a time to actually PROVE the concept!!

Verify f(x) and g(x) are inverses.

$f(x) = 2x - 4$ $g(x) = \frac{1}{2}x + 2$

$f(g(x))$ $g(f(x))$

$f(\frac{1}{2}x+2)$

$f(\frac{1}{2}x+2) = 2(\frac{1}{2}x+2) - 4$

$= x + 4 - 4$

$= x$

Verify f(x) and g(x) are inverses.

$$f(x) = -2x^5 \qquad g(x) = \sqrt[5]{\frac{-x}{2}}$$

$$g(f(x))$$

$$g(-2x^5) = \sqrt[5]{\frac{-(-2x^5)}{2}}$$

$$= \sqrt[5]{\frac{\cancel{2}x^5}{\cancel{2}}} = \sqrt[5]{x^5}$$

$$= x$$

Verify f(x) and g(x) are inverses.

$f(x) = 3\left(\frac{1}{2}x + 4\right)^{1/4} - 12$ $\quad$ $g(x) = 2\left(\frac{1}{3}x + 4\right)^{4} - 8$

$f(g(x)) =$

$f\left(2\left(\frac{1}{3}x+4\right)^4 - 8\right) =$

$3\left(\cancel{\frac{1}{2}}\left(\boxed{\cancel{2}\left(\frac{1}{3}x+4\right)^4 - 8}\right) + 4\right)^{\frac{1}{4}} - 12$

$3\left(\left(\frac{1}{3}x+4\right)^4 \cancel{-4+4}\right)^{\frac{1}{4}} - 12$

$3\left(\left(\frac{1}{3}x+4\right)^{\cancel{4}}\right)^{\cancel{\frac{1}{4}}} - 12$

$3\left(\frac{1}{3}x+4\right) - 12$

$x + 12 - 12 = x$

Homework:

p. 445 - 446 # 4 - 20, 24 - 28 &

Verifying WS (on the back of your notes!!)

Be sure to show EVERY little step.

Verify that *f* and *g* are inverse functions.

1. $f(x) = 2x + 7, \quad g(x) = \frac{1}{2}x - \frac{7}{2}$

2. $f(x) = -5x + 3, \quad g(x) = \frac{3}{5} - \frac{1}{5}x$

3. $f(x) = \sqrt{x - 4},$

$g(x) = x^2 + 4,$ where $x \geq 0$

4. $f(x) = \frac{1}{2}x^3, \quad g(x) = \sqrt[3]{2x}$

5. $f(x) = \frac{1}{3}x^4 + 2$ where $x \geq 0,$

$g(x) = \sqrt[4]{3x - 6}$