Operations w/ Functions - Calculator

p. 435 - complete the activity, then do # 1 - 4 -

Inverse Functions

Inverse Functions - "Undo" one another.

The symbol -1 in f^{-1} is not to be interpreted as an exponent. In other words, $f^{-1}(x) \neq \frac{1}{f(x)}$

Ex.1 $f(x) = x + 2$ $\quad f^{-1}(x) = x - 2$

Verify:

$f(f^{-1}(x)) = (x-2)+2 = x$ ✓

$f^{-1}(f(x)) = (x+2)-2 = x$ ✓

Ex.2 $f(x) = x^2$ $\quad f^{-1}(x) = \sqrt{x}$

Verify: $f(f^{-1}(x)) = (\sqrt{x})^2 = x$ ✓

$f^{-1}(f(x)) = \sqrt{(x^2)} = x$ ✓

f and g are inverses if f(g(x)) = x and g(f(x)) = x

f^{-1}

Find and verify the inverse: $y = 4x + 2$

$f(x) = 4x + 2$

Switch x and y. $y = 4x + 2$

Solve for y. $x = 4y + 2$

$-2 \quad -2$

$x - 2 = 4y$

$\frac{x-2}{4} = \frac{4y}{4}$

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

Verify:

$f(g(x)) = 4\left(\frac{x-2}{4}\right)+2 = (x-2)+2 = x$ ✓

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

Find and verify the inverse: $y = -\frac{2}{3}x + 2$

$f(x) = -\frac{2}{3}x + 2$

$y = -\frac{2}{3}x + 2$

$x = -\frac{2}{3}y + 2$

$-2 \quad -2$

$x - 2 = -\frac{2}{3}y$

$-\frac{3}{2}(x-2) = \left(-\frac{2}{3}y\right)\left(-\frac{3}{2}\right)$

$-\frac{3}{2}x + 3 = y = f^{-1}(x) = g(x)$

Verify: $f(g(x)) = -\frac{2}{3}\left(-\frac{3}{2}x+3\right) + 2$

$= x - 2 + 2 = x$ ✓

$g(f(x)) = -\frac{3}{2}\left(-\frac{2}{3}x+2\right) + 3$

$= x - 3 + 3 = x$ ✓