Using Composition to Identify Inverses

If f and g are functions with domains D_f and D_g, respectively, and for each all $x \in D_f$

$g(f(x)) = x$

and for each $x \in D_g$ $f(g(x)) = x$

then f and g are inverse functions

Example

$f(x) = 2x + 15$ **and** $f^{-1}(x) = \dfrac{x-15}{2}$

$f(x) = 2x + 15$

$$f(f^{-1}(x)) = 2\left(\frac{x-15}{2}\right)+15$$

$$f(f^{-1}(x)) = x - 15 + 15$$

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

Example **If f(x) = 6x – 2 and g(x) = $\frac{x-2}{6}$, are f(x) and g(x) inverses?**

Determine if f(g(x)) = g(f(x)) = x, then they are inverses.

f(g(x)) = 6(g(x)) – 2

= 6($\frac{x-6}{6}$) – 2

= x – 6 – 2

= x – 8

f and g are NOT inverses because f(g(x)) ≠ x. I can stop here.