Let $f(x) = 1 - x$ and $g(x) = 1/x$.

1. Find $f(g(x))$.

2. Find $g(f(x))$.

3. Find the domain of $f \circ g$.

4. Find the domain of $g \circ f$.

5. Is $f \circ g = g \circ f$? Why or why not? (One reason is enough.)

Extra credit curiosity: there are exactly six functions which can be obtained by composing f and g in every possible way. See if you can find them all.

1. $f(g(x)) = 1 - g(x) = 1 - \frac{1}{x}$ $\left(\text{OR} = f(\frac{1}{x}) = 1 - \frac{1}{x} \right)$

2. $g(f(x)) = \frac{1}{f(x)} = \frac{1}{1-x}$ $\left(\text{OR} = g(1-x) = \frac{1}{1-x} \right)$

3. Domain $(f \circ g) = \{ x \mid x \neq 0 \}$

4. Domain $(g \circ f) = \{ x \mid x \neq 1 \}$

5. No, $f \circ g \neq g \circ f$. For one, their domains differ.
   Also their values differ everywhere! $1 - \frac{1}{x} = \frac{1}{1-x}$ has NO real solutions.

$f \circ g (x) = 1 - \frac{1}{x}$

$g \circ f (x) = \frac{1}{1-x}$