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Quiz for June 1, 2006

Let X, Y, and Z be sets. Suppose that $f\colon X \to Y$ and $g\colon Y \to Z$ are one-to-one functions. Prove that the function $g \circ f\colon X \to Z$ is one-to-one.

ANSWER: Let x_1 and x_2 be elements of X with $(g \circ f)(x_1) = (g \circ f)(x_2)$. We must prove that $x_1 = x_2$.

We are given $g(f(x_1)) = g(f(x_2))$. The function g is one-to-one; hence, the elements $f(x_1)$ and $f(x_2)$ in Y are equal. The function f is one-to-one; hence, the elements x_1 and x_2 in X are equal.