Problem: If $f: X \to Y$ is an invertible function with inverse f^{-1}, show that the inverse of f^{-1} is f.

Solution:

$f: X \to Y$ is an invertible function with inverse $f^{-1}: Y \to X$

$\therefore$ By definition of inverse,

$$f \circ f^{-1} = I_Y \quad \& \quad f^{-1} \circ f = I_X$$

From the above, we can see that for the function $f^{-1}: Y \to X$, $f: X \to Y$ is a function that

$$f^{-1} \circ f = I_X \quad \& \quad f \circ f^{-1} = I_Y$$

$\therefore$ By definition of inverse, inverse of function f^{-1} is f.