Let $f \in F^E$ and $g \in G^F$ tow bijective functions. Then

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

Proof:
Let $y \in G$
$\Rightarrow \exists! \alpha \in F \mid g^{-1}(y) = \alpha$
$\Rightarrow \exists! x \in E \mid f^{-1}(\alpha) = x$
$\Rightarrow g \circ f(x) = g(\alpha) = y$
$\Rightarrow (g \circ f)^{-1}(y) = x$