Homework 2

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February 12, 2024

[Proof:] First, we compose $(g \circ h)^{-1}$ with $(g \circ h)$. This gives us,

$$(g \circ h)^{-1} \circ (g \circ h) = e.$$

Next compose $g^{-1} \circ h^{-1}$ with $(g \circ h)$. This gives us

$$\begin{aligned}(h^{-1} \circ g^{-1}) \circ (g \circ h) &= h^{-1} \circ (g^{-1} \circ g) \circ h \\ &= h^{-1} \circ h \\ &= e.\end{aligned}$$

Now, since $(g \circ h)^{-1} \circ (g \circ h) = (h^{-1} \circ g^{-1}) \circ (g \circ h)$, it follows that $(g \circ h)^{-1} = h^{-1} \circ g^{-1}$. ■

[Proof:]

Case 1: ■