

Discrete Compositions & inverses

Consider the following sets,

$$\begin{aligned}X &= \{1, 2, 3, 4, 5\} \\Y &= \{a, b, c, d\} \\Z &= \{A, 6, B, 7, E\}\end{aligned}$$

the following mappings,

$$\begin{aligned}f &: X \rightarrow Z \\g &: Y \rightarrow X \\h &: Z \rightarrow X\end{aligned}$$

and the following functions.

$$\begin{aligned}f &= \{(1, A), (2, 6), (3, B), (4, 7), (5, E)\} \\g &= \{(a, 1), (b, 2), (c, 3), (d, 5)\} \\h &= \{(A, 2), (6, 1), (B, 5), (7, 3), (E, 4)\}\end{aligned}$$

Determine if the following compositions exist. If so, define the associated mapping, function, and whether the function is 1-1 and/or onto. Where applicable, define the associated inverse.

1. $f \circ g$
2. $g \circ f$
3. $f \circ h$
4. $h \circ f$
5. $g \circ h$
6. $h \circ g$