

M421, Introduction to Topology I

Assignment 3

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Theorem 1. *If $f : X \rightarrow Y$ and $g : Y \rightarrow Z$ are both surjective functions, then $(g \circ f) : X \rightarrow Z$ is surjective.*

Proof. Let $z \in Z$. Since $z \in Z$ and because g is surjective, $\exists y \in Y \ni g(y) = z$. Now, since $y \in Y$ and f is surjective, $\exists x \in X \ni f(x) = y$.

$$\therefore (g \circ f)(x) = g(f(x))$$

$$\therefore g \circ f : X \rightarrow Z.$$

□