Problem. Let $f : X \rightarrow Y$ and $g : Y \rightarrow Z$ be functions.

i. Suppose $g \circ f$ is injective. Prove or disprove that $f$ must be injective. Prove or disprove that $g$ must be injective.

ii. Suppose $g \circ f$ is surjective. Prove or disprove that $f$ must be surjective. Prove or disprove that $g$ must be surjective.

iii. Suppose $g \circ f$ is bijective. Prove or disprove that $f$ must be bijective. Prove or disprove that $g$ must be bijective.