Dec 22, 2010

**METU, Fall 2010, Math 111, Section 1.**

# Quiz 4

1. Let $f : A \to B$ and $g : B \to C$. For each part, give either a proof or a counterexample to justify your answer.

   - If $g \circ f$ is surjective, then $f$ must be surjective.

   - If $g \circ f$ is surjective, then $g$ must be surjective.

2. A relation $R$ on a set $A$ is called antisymmetric if

$$(x \; R \; y \wedge y \; R \; x) \Rightarrow x = y$$

for all $x, y \in A$. Determine whether the following relations are antisymmetric or not.

- $R = \{(x, y) \in \mathbb{Z}^+ \times \mathbb{Z}^+ : x \text{ divides } y\}$.

- $S = \{(x, y) \in \mathbb{Z} \times \mathbb{Z} : x \text{ divides } y\}$.

- $T = \{(x, y) \in \mathbb{C} \times \mathbb{C} : |x| \leq |y|\}$.