1. a) State the definition of an injection.

b) Give an example of a function from $A = \{1, 2, 3\}$ to $B = \{a, b, c\}$ which is not injective, and make it clear why it is not.

c) Give an example of a function from $A = \{1, 2, 3\}$ to $B = \{a, b, c\}$ which is not surjective, and make it clear why it is not.

2. a) If there is an injection from \mathbb{N} to a set *A*, then *A* is countable.

b) If there is an injection from a set *A* to \mathbb{N} , then *A* is countable.

3. If $f:A \rightarrow B$ and $g:B \rightarrow C$ are surjective functions, then $g \circ f$ is surjective.

4. a) If $f: A \rightarrow B$ has an inverse function g, then g has f as an inverse function also.

b) Let $f: A \rightarrow B$ be a bijective function. Then there exists an inverse function g for f.

5. a) If $fA \rightarrow B$ and $g: B \rightarrow C$ are functions and $g \circ f$ is injective, then f is injective.

b) If $f:A \rightarrow B$ and $g: B \rightarrow C$ are functions and $g \circ f$ is injective, then g is injective.