**Discrete Math**
**Quiz 2**

**Name:**_____

You have 10 minutes to complete this quiz. If you have a question raise your hand and remain seated. In order to receive full credit your answer must be **complete**, **legible** and **correct**. Show your work, and give adequate explanations.

1. Fill in the blanks with the appropriate phrase, and then define the phrases in the blanks.

A **function** is a relation that satisfies the Function Rule.

(a) (First blank) A *relation* from $A$ to $B$ is a subset $R \subseteq A \times B$ of the Cartesian product of $A$ and $B$.

(b) (Second blank) The *Function Rule* for a relation $F \subseteq A \times B$ is the statement that for every $a \in A$ there is a unique $b \in B$ such that $(a, b) \in F$.

2. In each part below, give an example of $F, A, B$ such that $F : A \to B$ is a function that is:

(a) Injective but not surjective:

One example is $\iota_{\mathbb{N}} : \mathbb{N} \to \mathbb{R} : x \mapsto x$ (the inclusion function).

(b) Surjective but not injective:

One example is $f : \mathbb{R} \to [-1, 1] : x \mapsto \sin(x)$.

(c) Both injective and surjective:

One example is $\mathrm{id}_{\mathbb{R}} : \mathbb{R} \to \mathbb{R} : x \mapsto x$ (the identity function).