Discrete Math
Quiz 3

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. Explain why the equality relation on A is an equivalence relation on A. (The equality relation on A is $\{(x, y) \in A \times A \mid x = y\}$.)

We know two methods to check that a relation is an equivalence relation: (i) check the definition of "equivalence relation" (that is, show that the relation is reflexive, symmetric, and transitive), or (ii) show that it is the kernel of some function. We use the first method here.

(1) (reflexive) For any $a \in A$, $a = a$ is a property of equality. Thus $=$ is reflexive.
(2) (symmetric) For any $a, b \in A$, if $a = b$, then $b = a$. Thus $=$ is symmetric.
(3) (transitive) For any $a, b, c \in A$, if $a = b$ and $b = c$, then $a = c$. Thus $=$ is transitive.

2. Give an example of a function whose kernel is the equality relation on A.

Now we use the second method to prove that equality is an equivalence relation: we show that it is the kernel of a function.

The identity function $\mathrm{id}_A : A \to A : a \mapsto a$ has the equality relation as its kernel. (You could also write this function as $f(x) = x$.)