ProofSpace Comprehension Quiz

Functions

Injections, Surjections, and Bijections

1 For each word in Column A, choose the appropriate definition from Column B. Each entry in Column B may be used no more than once. For all definitions, assume $f : D \to G$.

Column A	**Column B**
_____**1)** Injection	**a)** $\forall x \in D, \exists y \in G$ such that $y = f(x)$.
_____**2)** Surjection	**b)** $\forall y \in G, \exists x \in D$ such that $y = f(x)$.
_____**3)** Bijection	**c)** $\forall y_1, y_2 \in G, \exists x_1, x_2 \in D$ such that $f(x_1) \neq f(x_2)$.
	d) $(\forall y \in G)(f(x) = y \Rightarrow x = f^{-1}[\{y\}])$.
	e) $(\forall x_1, x_2 \in D)(x_1 \neq x_2 \Rightarrow f(x_1) \neq f(x_2)$.
	f) $(\forall y_1, y_2 \in G)(y_1 \in G \Rightarrow f(y_2) \neq y_1)$.
	g) f is injective or surjective but not both.
	h) f is neither injective nor surjective.
	i) f is both injective and surjective.

2 For each function from $\mathbb{R}$ to $\mathbb{R}$ below, decide if the function is injective, surjective, bijective, and/or none.

a) $f(x) = x$

b) $g(x) = x^2$

c) $h(x) = e^x$

d) $i(x) = \pi$.