Definition 1. Let A and B be sets. A relation f from A to B...

is called...	if...
a **function**	$\forall\, a \in A,\ \exists!\, b \in B,\ (a, b) \in f$
injective or **one-to-one**	$\forall\, a, a' \in A, \forall\, b \in B,\ \big((a, b) \in f \wedge (a', b) \in f \implies a = a'\big)$
surjective or **onto**	$\forall\, b \in B,\ \exists\, a \in A,\ (a, b) \in f$
bijective	f is injective and surjective
an **injection**	f is an injective function
a **surjection**	f is a surjective function
a **bijection**	f and f^{-1} are both functions

If f is a function from A to B then and $a \in A$ then we write $f(a)$ for the unique $b \in B$ such that $(a, b) \in f$. We write $f : A \to B$ to mean "f is a function from A to B." We call A the *domain* of f and B the *codomain* of f.

Problem 2. Let $A = \{1, 2, 3\}$ and let $B = \{4, 5\}$. Let $f = \{(1, 4), (2, 4)\}$. Which element should you add to f to make f a function from A to B?

A) $(1, 5)$

B) $(3, 4)$

C) $(3, 6)$

D) $(0, 4)$

E) f is already a function from A to B.

Solution. B) □

Problem 3. Let $f : \{\text{people}\} \to \{\text{people}\}$ be the function with $f(P) = (P\text{'s father})$. Which of the following are true?

A) f is injective.

B) f is surjective.

C) f is both injective and surjective.

D) f is neither injective nor surjective.

Solution. D) □

Problem 4. Let $f : \{\text{only children}\} \to \{\text{people}\}$ be the function with $f(P) = (P\text{'s father})$. Which of the following are true?

A) f is injective.

B) f is surjective.

C) f is both injective and surjective.

D) f is neither injective nor surjective.

Solution. A) □