Onto Functions

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Learning Objectives

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- Prove a given function is (not) onto.

When is a function onto?

Definition

A function $f : A \to B$ is ***onto*** if its image is its entire co-domain, that is, $f(A) = B$.

Proving Onto

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$\forall y \in B, \exists x \in A, f(x) = y$

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Example

$f : \mathbb{Z} \to \mathbb{Z}, f(n) = \left\lfloor \frac{3n-2}{4} \right\rfloor$

Proving NOT Onto

Proving NOT Onto

$$\neg(\forall y \in B, \exists x \in A, f(x) = y) \equiv \exists y \in B, \forall x \in A, f(x) \neq y$$

Proving NOT Onto

$\neg(\forall y \in B, \exists x \in A, f(x) = y) \equiv \exists y \in B, \forall x \in A, f(x) \neq y$

Example

$g : \mathbb{Z} \to \mathbb{Z}, f(n) = 5n - 4$

Recap: Learning Objectives

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