## 1. More on Sets

Prove that $A \subseteq B \leftrightarrow \bar{B} \subseteq \bar{A}$. Note: $\bar{A}=\{x: x \notin A\}$.

## 2. Functions

For all functions and mappings below, state whether they are one-to-one, onto, or both. Let the sets for domain and co-domain be defined as follows:
$A=\{x: x \in \mathbb{R}, x \geq 1\}$.
$B=\{x: x \in \mathbb{R}, 0 \leq x \leq 1\}$
$C=\{x: x \in \mathbb{R},-1 \leq x \leq 1\}$
(i) $f: A \rightarrow B, f(x)=\frac{1}{x}$
(ii) $f: B \rightarrow C, f(x)=x^{2}$
(iii) $f: B \rightarrow B, f(x)=x^{2}$
(iv) $f: C \rightarrow B, f(x)=x^{2}$

## 3. Modular Arithmetic

Find an integer $a$ such that:
(i) $a \equiv 43(\bmod 23),-22 \leq a \leq 0$
(ii) $a \equiv 17(\bmod 29),-14 \leq a \leq 14$
(iii) $a \equiv-11(\bmod 21), 90 \leq a \leq 110$

