Set Proofs Continued

Set Proofs Continued

Inclusion

Basic principle: $A \subseteq B$ is equivalent to the statement $x \in A \implies x \in B$. One can prove this both directly and as $x \notin B \implies x \notin A$.

Proposition: Let $A = \{2x + 4 : x \in \mathbb{Z}\}$. Let $B = \{2x : x \in \mathbb{Z}\}$. Then $A \subseteq B$.

More examples

Proposition: For all $k \in \mathbb{Z}$, let $A = \{n \in \mathbb{Z} : n|k\}$ and let $B = \{n \in \mathbb{Z} : n|k^2\}$. Then $A \subseteq B$. (Note: this is problem 3 on page 171.)

More examples

Proposition: Suppose A, B, and C are sets. If $B \subseteq C$, then $A \times B \subseteq A \times C$. (This is problem 7 on page 171)

One more

Proposition: Let A and B be sets. Prove that $A \subseteq B$ if and only if $A - B = \emptyset$.