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$\forall a$ If a^2 is even, then a is even.

Proof by Contradiction:

Suppose a^2 is even and a is not even.

Then a^2 is even and a is odd

Since a is odd, there is an integer c which $a = 2c+1$

Then $a^2 = (2c+1)^2 = 4c^2 + 4c + 1 = 2(2c^2+2c)+1$, so a^2 is odd.

Thus a^2 is even and a^2 is odd, a contradiction.

2. Proof $A \cap B \subseteq A$ by contradiction.

Proof Proof by contradiction.

We know that "$A \cap B \subseteq A$" means "$\forall x\ x \in A$ and $x \in B \rightarrow x \in A$"
We assume that "$\forall x$ $x \in A$ and $x \in B$ and $x \notin A$
$x \in A$ and $x \notin A$, a contradiction.

$\therefore (A \cap B) \subseteq A$