Find the contrapositive:

If $\underline{a \in \mathbb{Q}}$ and $a > \frac{7}{2}$ then $a^2 > \frac{49}{4}$

✗ If $a^2 \leq \frac{49}{4}$ then $\underline{\underline{a \notin \mathbb{Q}}}$ or $a \leq \frac{7}{2}$

✓ If $a \in \underline{\mathbb{Q}}$ and $a^2 \leq \frac{49}{4}$ then $a \leq \frac{7}{2}$

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If I want to show $A \subset B$

Pf   Let $a \in A$ be arbitrary.
     By the def. of A, we have
         that $a = \ldots .$
     Majic
     $a \in B$.

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W.T.S $A \not\subset B$

show there exists $a \in A$ w/ $a \notin B$.

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W.T.S $f: A \to B$ is 1-1

Let $a, b \in A$ w/ $f(a) = f(b)$ be arbitrary.

(usually)

$f(a) = $ stuff w/ a in it
$f(b) = $ thing w/ b in it

and $f(a) = f(b)$ by assumption so we have

("stuff w/ a") = ("thing w/ b")

if we can do some algebra to get rid of "stuff" and "thing" and end up w/ $a = b$ then f is injective.

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W.T.S. $f: A \to B$ is onto

Let $b \in B$ be arbitrary
find $a \in A$ w/ $f(a) = b$.

(usually this means solving $f(a) = b$ for a in terms of b)