High school geometry theorems

Hilbert's axiomatic system.
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Theorem 1 (th_3_01.) *Assuming that $\alpha \neq \beta$ and $A \in \alpha$ and $A \in \beta$ there exist point B, such that $A \neq B$ and $B \in \alpha$ and $B \in \beta$.*

Proof:

1. From the facts $\alpha \neq \beta$ and $A \in \alpha$ and $A \in \beta$ there exist a point B where $A \neq B$ and $B \in \alpha$ and $B \in \beta$ (using ax_I7).
2. The conclusion follows from the facts $A \neq B$ and $B \in \alpha$ and $B \in \beta$.

QED

Theorem 2 (th_3_02.) *Assuming that $\alpha \neq \beta$ and $A \in \alpha$ and $A \in \beta$ and $A \neq B$ and $B \in \alpha$ and $B \in \beta$ there exist line p, such that $A \in p$ and $B \in p$.*

Proof:

1. From the fact $A \neq B$ there exist a line p where $A \in p$ and $B \in p$ (using ax_I1).
2. The conclusion follows from the facts $A \in p$ and $B \in p$.

QED

Theorem 3 (th_3_03.) *Assuming that $\alpha \neq \beta$ and $A \in \alpha$ and $A \in \beta$ and $A \neq B$ and $B \in \alpha$ and $B \in \beta$ and $A \in p$ and $B \in p$ it holds that $p \in \alpha$ and $p \in \beta$.*

Proof:

1. From the facts $A \neq B$ and $A \in p$ and $B \in p$ and $A \in \alpha$ and $B \in \alpha$ it holds that $p \in \alpha$ (using ax_I6).
2. From the facts $A \neq B$ and $A \in p$ and $B \in p$ and $A \in \beta$ and $B \in \beta$ it holds that $p \in \beta$ (using ax_I6).
3. The conclusion follows from the facts $p \in \alpha$ and $p \in \beta$.

QED
