∀ x ∈ ∅, P(x) is **always (vacuously) true**.

∃ x ∈ ∅ | P(x) is **always false**
\[ \sim (\forall x \in X, P(x)) \]

\[ \equiv \sim (P(x_1) \land P(x_2) \land \cdots) \]

\[ \equiv \sim P(x_1) \lor \sim P(x_2) \lor \cdots \quad \text{By DeMorgan’s Law} \]

\[ \equiv \exists x \in X \mid \sim P(x) \]
1. Bob passed through $P$.
2. Bob passed through $N$.
3. Bob passed through $M$.
4. If Bob passed through $O$, then Bob passed through $F$.
5. If Bob passed through $K$, then Bob passed through $L$.
6. If Bob passed through $L$, then Bob passed through $K$.

Based on example by Susanna Epp, 2006