Chapter 12

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12.1

12.1a There exists an x such that for all y, x loves y

12.1b There exists an x such that for all y, x does not love y.

12.1c There does not exist an x such that for all y, x loves y.

12.3

12.3a True

12.3b True

12.3c True

12.3d True

12.3e True

12.5

12.5a $\forall A \forall B \exists C \forall x (x \in C \leftrightarrow (x \in A \lor x \in B))$

12.5b $\forall A \exists B \forall x (x \in B \leftrightarrow \neg(x \in A))$

12.5c $\forall A \forall B \forall x ((B \subseteq A \land x \in B) \rightarrow x \in A)$

12.5d $\exists X \forall Y \forall x (x \notin X \land X \subseteq Y)$

12.5e $\forall A \exists P \forall B (B \subseteq A \rightarrow B \in P)$