

1. $E(x)$: x uses Emacs

$H(x)$: x knows programming language Haskell

a) Some one use Emacs but don't know Haskell

$$\exists x (E(x) \wedge \neg H(x))$$

b) Every one who know Haskell uses Emacs

$$\forall x (H(x) \Rightarrow E(x))$$

3) Nobody uses Emacs or Haskell

$$\neg \forall x (H(x) \vee E(x))$$

Prove $A = (A - B) \cup (A \cap B)$

$$\begin{aligned} (A - B) \cup (A \cap B) &= \{x \mid x \in (A - B) \vee x \in (A \cap B)\} \quad \text{by definition of union.} \\ &= \{x \mid [\neg(x \in B) \wedge (x \in A)] \vee [x \in A \wedge (x \in B)]\} \\ &= \{x \mid x \in A \wedge (x \notin B \vee x \in B)\} = \{x \mid x \in A \wedge \top\} \\ &= \{x \mid x \in A\} \\ &= A. \end{aligned}$$