Name: Rohit Kudache USN: 1BM18CS083

(1) $\forall x [\exists z \text{ Animal}(z) \Rightarrow \text{kills}(x,z)] \Rightarrow [\forall y \neg \text{loves}(y,x)]$

→ Step 1: Eliminate $\Rightarrow$

$\forall x [\neg \exists z \neg \text{Animal}(z) \vee \text{kills}(x,z)] \vee [\forall y \neg \text{loves}(y,x)]$

Step 2: $\neg$ inward

$\forall x [\forall z \text{ Animal}(z) \wedge \neg \text{kills}(x,z)] \vee [\forall y \neg \text{loves}(y,x)]$

Step 3: change quantifier

$\forall x [\forall z \text{ Animal}(z) \wedge \neg \text{kills}(x,z)] \vee [\forall z \neg \text{loves}(z,x)]$

Step 4: Skolemize

$\forall x [\text{Animal}(F(x)) \wedge \neg \text{kills}(x,F(x))] \vee \neg \text{loves}(G(x),x)$

Step 5: Drop universal quantifier

$[\text{Animal}(F(x)) \wedge \neg \text{kills}(x,F(x))] \vee \neg \text{loves}(G(x),x)$

Step 6: Distribute

$[\text{Animal}(F(x)) \vee \neg \text{loves}(G(x),x)] \wedge [\text{Animal}(F(x)) \vee \neg \text{loves}(G(x),x)]$

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(2) Rules

- cold and precipitation → snow
  ¬cold V ¬ precipitation V snow
- January → cold
  ¬ January V cold
- Clouds → precipitation
  ¬ clouds V precipitation

Facts

- January, clouds

Prove

- snow

¬snow ¬cold V ¬precipitation V snow

¬cold V ¬precipitation ¬ January V cold

¬January V ¬precipitation ¬clouds V precipitation

January ¬ January V ¬ clouds

¬clouds clouds

□

10/12/2020