AI

Assignment = 01

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5 - B

1.] FOL into CNF

$$\forall x [\exists z \text{ Animal}(z) \wedge \text{Kills}(x,z)] \Rightarrow [\forall y \rightarrow \text{Loves}(y,x)]$$

A1.]

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

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

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

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

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

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

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

2.] Convert the sentences into FOL & prove using resolution.

i.] Cold & precipitation ⟶ snow

cold (x) ∧ precipitation (x) ⇒ snow (x)

¬ (cold (x) ∧ precipitation (x)) ∨ snow (x)

¬ ∃ cold (x) ∨ ¬ precipitation (x) ∨ snow (x)

ii.] January ⟶ cold

January (x) ⇒ cold ¬ January (x) ∨ cold (x)

iii.] Clouds → precipitation

clouds (x) ⇒ precipitation (x) — clouds (x) ∨ precipitation

iv.] January (x)

v.] Clouds (x)

To prove :- snow (x)

→ Resolution of (i) & (ii)

vi.] ⟶ Precipitation (x) ∨ snow (x) ∨ ¬ January (x)

→ Resolution of (vi) & (iv)

vii) ⟶ Precipitation (x) ∨ snow (x)

→ Resolution of (vii) & (iii)

viii) ⟶ snow (x) ∨ ¬ clouds (x)

→ Resolution of (viii) & (iv)

snow (x) , ∴ Hence, Proved.