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2) convert following FOL to CNF

$\forall x [\exists z Animal(z) \wedge kills(x,z)] \Rightarrow [\forall y \neg loves(y,x)]$

i) Eliminate Implication

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

ii) move $\neg$ inwards

$\neg \exists x p \equiv \forall x \neg p$

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

$\forall x [\forall z \neg (Animals(z)) \vee \neg kills(x,z)]$

$\vee \forall y \neg loves(y,x)$

iii) Drop universal quantifiers

$[\neg Animal(z) \vee \neg kills(x,z)] \vee \neg loves(y,x)$

iv) CNF :-

$\neg Animal(z) \vee \neg kills(x,z) \vee \neg loves(y,x$

Convert the sentences into FOL and prove using resolution

(i) Cold and 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 (x)

¬ January (x) ∨ cold (x)

(iii) ~~Ice~~ Clouds → Precipitation.

clouds (x) ⇒ precipitation (x).

¬ clouds (x) ∨ precipitation (x)

(iv) January (x)

(v) Clouds (x)

To prove :- snow (x)

→ Resolution of (i) & (ii) (vi) ¬ precipitation (x) ∨ snow (x) ∨ ¬ Jan (x).

→ Resolution of vi & iv.

(vii) ¬ precipitation (x) ∨ snow (x)

→ Resolution of (vii) and (iii)

(viii) Snow (x) ∨ ¬ clouds.

→ Resolution of viii and v

snow (x)

Hence proved