AI - Assignment

MANU. N. Y
1BM18CS053

1) FOL into CNF

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

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

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

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

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

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

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

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

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

a) Convert the sentences into FOL & prove using resolution:

i) Cold and precipitation $\rightarrow$ Snow

$\text{Cold}(x) \wedge \text{precipitation}(x) \Rightarrow \text{snow}(x)$

$\neg (\text{cold}(x) \wedge \text{precipitation}(x)) \vee \text{snow}(x)$

$\neg \text{cold}(x) \vee \neg \text{precipitation}(x) \vee \text{snow}(x)$

ii) January $\rightarrow$ cold

$\text{January}(x) \Rightarrow \text{cold}$

$\neg \text{January}(x) \vee \text{cold}(x)$

iii) clouds $\rightarrow$ precipitation

$\text{clouds}(x) \Rightarrow \text{precipitation}(x)$

$\neg \text{clouds}(x) \vee \text{precipitation}(x)$

iv) January(x) v) clouds(x)

To prove:- Snow(x)

$\rightarrow$ Resolution of i) & ii)

vi) $\neg$ Precipitation(x) $\vee$ snow(x) $\vee$ $\neg$ January(x)

→ Resolution of vi) & iv)

vii) $\neg$ Precipitation(x) $\vee$ snow(x) ~~$\vee$ $\neg$ January(x)~~

→ Resolution of vii) & iii)

viii) Snow(x) $\vee$ $\neg$ clouds(x)

→ Resolution of viii) & v)

Snow(x)

Hence proved