Dis 10/22

Monday, October 22, 2018 10:00 AM

16.3 (1) convert the following to clause form:

$$((\exists x)[P(x)] \vee (\exists x)[Q(x)]) \supset (\exists x)[P(x) \vee Q(x)]$$

Soln

$$\neg((\exists x)[P(x)] \vee (\exists x)[Q(x)]) \vee (\exists x)[P(x) \vee Q(x)]$$

Recall: $\exists$ there exists, $\forall$ for all x,

$$\neg(\exists x)[P(x)] \wedge \neg(\exists x)[Q(x)] \vee (\exists x)[P(x) \vee Q(x)]$$

$$(\forall x)[\neg P(x)] \wedge (\forall y)[\neg Q(y)] \vee (\exists z)[P(z) \vee Q(z)]$$

// can take out $\forall x$ // assign diff variable

Skolem function

$$(\forall x)(\exists y)(P(x,y))$$

$$\downarrow h(x)$$

$$\rightarrow (\forall x)(P(x, h(x)))$$

$$(\forall x)[\neg P(x)] \wedge (\forall x)[\neg Q(x)] \vee P(SK) \vee Q(SK)$$

SK: function

$$\neg P(x) \wedge \neg Q(y) \vee (P(SK) \vee Q(SK))$$

Need to finish

16.4

(1) member (Mike, Alpine) // Mike member of Alpine club

(2) member (Tony, Alpine)

(3) member (John, Alpine)

// for every member in Alpine club, either in ski or mountain climber

$$(\forall x)\ \text{member}(x, \text{Alpine}) \supset [\text{Skier}(x) \vee MC(x)]$$

$$\neg(\exists x)[MC(x) \wedge \text{Likes}(x, \text{rain})]$$

$$(\forall x)[\text{Skier}(x) \supset \text{Likes}(x, \text{snow})]$$

$$(\forall x)[\text{Likes}(\text{Tony}, x) \supset \neg\text{Likes}(\text{Mike}, x)]$$

$$(\forall x)[\neg\text{Likes}(\text{Tony}, x) \supset \text{Likes}(\text{Mike}, x)]$$

$$\text{Likes}(\text{Tony}, \text{rain}) \wedge \text{Likes}(\text{Tony}, \text{snow})$$

(9) (10)

(11) $\neg\text{Member}(x, \text{Alpine}) \vee \text{Skier}(x) \vee MC(x)$

(5) $\neg MC(x) \vee \neg\text{Likes}(x, \text{rain})$

(6) $\neg\text{Skier}(x) \vee \text{Likes}(x, \text{snow})$

Prove? pf: [ ] $\vee$ Ans(x) — this constant is answer?

Resolution Refutation

[ ] $\vee$ [ ]

NIL → root node

(6) $\neg Skier(x) \vee Likes(x, snow)$

(7) $\neg Likes(Tony, x) \vee \neg Likes(Mike, x)$

(8) $Likes(Tony, x) \vee Likes(Mike, x)$

the question (11) $(\exists x)[Member(x, Alp) \wedge MC(x) \wedge \neg Skier(x)]$
$\Rightarrow \neg Memb(x, Alp) \vee \neg MC(x) \vee Skier(x) \vee \underline{Ans(x)}$

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(12) : (11) + (4)

$\neg Memb(x, Alp) \vee Skier(x) \vee Ans(x)$

(13) : (12) + (1) ← can do 1, 2 or 3 // assign x to Mike / Tony / Hunh

$Skier(Mike) \vee Ans(Mike)$

(14) i (13) f(6) // $x = Mike$

$Likes(Mike, snow) \vee Ans(Mike)$

(15) : (14) + (7)

$\neg Likes(Tony, snow) \vee Ans(Mike)$

(16) : (15) f (10)

$Ans(Mike)$