٩٧٣٢٤٩٩ ساسان وحیدی نیا

① Ⓐ

(i.) $\Delta = \{\{a, \neg b\}, \{a, b, c\}, \{\neg a, c\}, \{\neg c, \neg b\}\}$

$C_1 = \{a, \sim b\}$, $C_2 = \{a, b, c\}$, $C_3 = \{\sim a, c\}$, $C_4 = \{\sim a, \sim b\}$

$Cl = \{C_1, C_2, C_3, C_4\}$

$P_1 = C_1(a), C_3(\sim a)$ $\{a, \sim b\} : \{\sim a, c\}$ $(C_1 - \{a\} \cup C_3 - \{\sim a\})$
$\Rightarrow$ resolvent: $\{\sim b, c\}$

$P2 : C_2(a), C_3(\sim a)$ $\{a, b, c\} : \{\sim a, c\}$ $(C_2 - \{a\} \cup C_3 - \{\sim a\})$
$\Rightarrow$ resolvent: $\{b, c\}$

$P3 : C_2 b, C_1(\sim b)$ $\{a, b, c\} : \{a, \sim b\}$ $(C_2 - \{b\} \cup C_1 - \{\sim b\})$
resolvent: $\{a, c\}$

$P4 : C_2(b), C_4(\sim b)$ $\{a, b, c\} : \{\sim c, \sim b\}$ $(C_2 - \{b\} \cup C_4 - \{\sim b\})$
resolvent: $\{a, c, \sim c\}$

$P_5 : C_2(c), C_4(\sim c)$ $\{a, b, c\} : \{\sim c, \sim b\}$ $(C_3 - \{c\} \cup C_4 - \{\sim c\})$
resolvent: $\{\sim a, \sim b\}$

$P_6 : C_3(c), C_4(\sim c)$ $\{\sim a, c\} : \{\sim c, \sim b\}$ $(C_3 - \{c\} \cup C_4 \{\sim c\})$
resolvent: $\{\sim a, \sim b\}$

①

(ii) $\Delta = \{\{a, \neg a, \neg b\}, \{a, b, c\}, \{\neg a, \neg b, \neg c\}, \{b\}\}$

$C_1 = \{a, \sim a, \sim b\}$, $C_2 = \{a, b, c\}$, $C_3 = \{\sim a, \sim b, \sim c\}$, $C_4 = \{b\}$

$\Delta = \{C_1, C_2, C_3, C_4\}$

P_1: $C_1(a)$, $C_3(\sim a)$ $\{a, \sim a, \sim b\} : \{\sim a, \sim b, \sim c\}$

$(C_1 - \{a\} \cup C_3 - \{\sim a\})$ resolvents $\{\sim a, \sim b, \sim c\}$

P_2: $C_2(a)$, $C_1(\sim a)$ $\{a, b, c\} : \{a, \sim a, \sim b\}$ $(C_2 - \{a\} \cup C_1 - \{\sim a\})$

resolvent: $\{b, c, a, \sim b\}$

P_3: $C_2(a)$, $C_3(\sim a)$ $\{a, b, c\} : \{\sim a, \sim b, \sim c\}$ $(C_2 - \{a\} \cup C_3 - \{\sim a\})$

resolvent: $\{b, c, \sim b, \sim c\}$

P_4: $C_2(b)$, $C_1(\sim b)$ $\{a, b, c\} : \{a, \sim a, \sim b\}$ $(C_2 - \{b\} \cup C_1 - \{\sim b\})$

resolvent: $\{a, c, \sim a\}$

P_5: $C_2(b)$, $C_3(\sim b)$ $\{a, b, c\} : \{\sim a, \sim b, \sim c\}$ $(C_2 - \{b\} \cup C_3 - \{\sim b\})$

resolvent: $\{a, c, \sim a, \sim c\}$

P_6: $C_2(c)$, $C_3(\sim c)$ $\{a, b, c\} : \{\sim a, \sim b, \sim c\}$ $(C_2 - \{c\} \cup C_3 - \{\sim c\})$

resolvent: $\{a, b, \sim a, \sim b\}$

P_7: $C_4(b)$, $C_1(\sim b)$ $\{b\} : \{a, \sim a, \sim b\}$ $(C_4 - \{b\} \cup C_1 - \{\sim b\})$

resolvent: $\{a, \sim a\}$

P_8: $C_4(b)$, $C_3(\sim b)$ $\{b\} : \{\sim a, \sim b, \sim c\}$ $(C_4 - \{b\} \cup C_3 - \{\sim b\})$

resolvent: $\{\sim a, \sim c\}$

(2)

(B) 1) $P(x) \rightarrow Q(x) \vee M(x) \xRightarrow{\text{implication elimanation}} \sim P(x) \vee Q(x) \vee M(x)$

2) $\neg Q(x) \vee R(y,x) \vee \neg P(y) \Rightarrow Q(x) \rightarrow R(y,x) \vee \sim P(y)$ *

3) $\neg M(y) \rightarrow \neg(\neg P(x) \wedge R(x,y)) \Rightarrow M(y) \vee P(x) \vee \sim R(x,y)$

implication elimaination

4) R(John, Pit)

5) ¬ R(John, Mary)

6) P(Pit)

7) Q(Mary)

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8) $\sim M(x) \to \sim P(x) \vee Q(x)$ (4) (reverse implication elimination)

9) $\sim Q(Mary) \vee R(John, Mary) \vee \sim P(John)$ (2)(7)(5)

10) $\sim P(John)$ (since 3 $\Rightarrow \sim P(x) \to M(y) \vee \sim R(x, y)$)

then 11) $M(Pit) \vee \sim R(John, Pit)$

12) $M(Pit)$ (4)

idk what to do from now

(2) (A)

If $\underbrace{\text{Elisabeth}}_{e}$ is $\underbrace{\text{the mother of}}_{Mxy}$ $\underbrace{\text{charles}}_{c}$ then $\underbrace{\text{someone}}_{\exists x}$ $\underbrace{\text{loves}}_{Lxy}$ $\underbrace{\text{Charles}}_{c}$.

Mxy → x is the mother of y

Lxy → x Loves y

$$\exists x [Lxc \wedge Mec] \equiv \exists x [Loves(x,c) \wedge Mother\text{-}of(e,c)]$$

$\underbrace{\text{Some}}_{\exists}$ $\underbrace{\text{dogs}}_{Dx}$ $\underbrace{\text{hate}}_{Hxy}$ $\underbrace{\text{all}}_{\forall}$ $\underbrace{\text{cats}}_{Cy}$ who $\underbrace{\text{eat}}_{Exy}$ $\underbrace{\text{birds}}_{Bz}$.

∀

Hxy → x hates y

Exy → x eats y

$$\exists_x [D_x] \wedge \forall y [C_y] \wedge \exists_z [B_z] \wedge E_{yz} \longrightarrow H_{xy}$$

$$\exists_x [Dog(x)] \wedge \forall y [Cat(y)] \wedge \exists z [Bird(z)] \wedge Eats(y, z) \longrightarrow Hate(x, y)$$

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B

برای هر n کوچکتر از صفر، مکعب n هم کوچکتر از صفر است

دانش آموزی هست که

به هر دانش آموزی که یاد نگرفته است، [درس] یاد
می دهد

هر دانش آموزی دو دوست متفاوت دارد.

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③ a) there are exactly two mines adjacent to [1,1] involving some logical combination of x_{ij}. total 28 disjuncts. two neighbors are true and others are false. the other 27 each select 2 different x_{ij} to be true.

b) k of n neighbors contain minee will be "C_k^n" which k of n is true and others are false.

c) for each cell probed, take the resulting number n and then construct $\binom{n}{8}$ disjuncts. conjoin all the sentences together and use DPLL to answer the question

e) Nö

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4) a) $\exists x \left[Parent(Joan, x) \wedge Female(x) \right]$

b) $\exists^1 x \left[Parent(Joan, x) \wedge Female(x) \right]$ ~~a~~ we dont care about ~~may~~

c) $\exists^1 x \left[Parent(Joan, x) \xrightarrow{\text{which is}} Female(x) \right]$

d) $\exists^1 x \left[Parent(Joan, x) \wedge Parent(Kevin, x) \right]$

e) $\exists^1_x \left[Parent(Joan, x) \longrightarrow Parent(Kevin, x) \right]$

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