Theme | Assignment 1 Q-(3) | Date

(a) Glossary

v, a, b, c — represent Victor, Arthur, Bertam and Carelton respectively

m(x) - means x is the murderer

f(x, y) - means x is friends with y

ω(x, y) - means x was with y

(1) $m(a) \vee m(b) \vee m(c)$

(2) $(\neg m(a) \vee \neg m(b)) \wedge (\neg m(a) \vee \neg m(c)) \wedge (\neg m(b) \vee \neg m(c))$

(3) $\neg m(a) \rightarrow f(b, v)$

(4) $\neg m(a) \rightarrow \neg f(c, v)$

(5) $\neg m(b) \rightarrow \neg \omega(b, v)$

(6) $\neg m(b) \rightarrow \neg f(b, v)$

(7) $\neg m(c) \rightarrow \omega(a, v)$

(8) $\neg m(c) \rightarrow \omega(b, v)$

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b) Clausal form

(1) (m(a), m(b), m(c))
(2) (¬m(a), ¬m(b))
(3) (¬m(a), ¬m(c))
(4) (¬m(b), ¬m(c))
(5) (m(a), f(b,v))
(6) (m(a), ¬f(c,v))
(7) (m(b), ¬w(b,v))
(8) (m(b), ¬f(b,v))
(9) (m(c), w(a,v))
(10) (m(c), w(b,v))

c) Representation in FOL :- ∃X m(x)
|| || clausal-form (with answer
(11) predicate) :- (¬m(x), ans(x))
(12) Resolve [5 & 9] = (m(a), m(b))
(13) Resolve [7 & 10] = (m(b), m(c))
(14) Resolve [8 & 13] = (m(a), m(b))
(15) Resolve [12 & 14] = (m(b))
(16) Resolve [15 & 11] = ans(b) {x=b}

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(d) By removing (2) from the knowledge base in part (a) or removing (2) (3) (4) from part b we can satisfy this requirement.

Consider the interpretation

$I = \langle D, \Phi, \Psi, V \rangle$ where

$D = \{v, a, b, c\}$

$\Phi(x) = x$ for all $x \in D$

$\Psi(m) = \{a, c\}$

$\Psi(f) = \{\}$

$\Psi(\omega) = \{\}$

$I \models m(a)$ satisfies (1), (5), (6)

$I \models m(c)$ satisfies (1), (9), (10)

$I \models \neg f(b, v)$ satisfies (8)

$I \models \neg \omega(b, v)$ satisfies (7)