COMP5211 Advanced Artificial Intelligence
Assignment 3

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Problem 1

Let's assume that,

- A lady is in room 1: L_1

- A tiger is in room 1: $\neg L_1$

- A lady is in room 2: L_2

- A tiger is in room 2: $\neg L_2$

- A lady is in room 3: L_3

- A tiger is in room 3: $\neg L_3$

- The sign of room 1 is true: S_1

- The sign of room 2 is true: S_2

- The sign of room 3 is true: S_3

Here we give the axiomatization of this question.

Propositions: L_1, L_2, L_3, S_1, S_2, S_3.

KB:

$$(L_1 \wedge \neg L_2 \wedge \neg L_3) \vee (\neg L_1 \wedge L_2 \wedge \neg L_3) \vee (\neg L_1 \wedge \neg L_2 \wedge L_3),$$
$$(S_1 \wedge \neg S_2 \wedge \neg S_3) \vee (\neg S_1 \wedge S_2 \wedge \neg S_3) \vee (\neg S_1 \wedge \neg S_2 \wedge S_3) \vee (\neg S_1 \wedge \neg S_2 \wedge \neg S_3),$$
$$\neg L_1 \equiv S_1,$$
$$L_2 \equiv S_2,$$
$$\neg L_2 \equiv S_3.$$

Query:

- if KB $\models L_1$.

- if KB $\models L_2$.

- if KB $\models L_3$.

Problem 2

Let's define:

- 4 integer variables: $Lisa$, Bob, Jim, $Mary$, representing their rankings.

- A set $People$ containing the 4 variables above, i.e. $People = \{Lisa, Bob, Jim, Mary\}$.

- A 1-ary predicate $bioMajor(x)$, meaning x is a biology major.

Then let a term $P(Lisa, Bob, Jim, Mary)$ denote:

$$
\begin{aligned}
&[\\
&(\; |Lisa - Bob| \neq 1 \;) \\
&\wedge \; (\; (Jim = Lisa - 1 \wedge bioMajoy('Lisa')) \vee (Jim = Bob - 1 \wedge bioMajoy('Bob')) \\
&\quad \vee (Jim = Mary - 1 \wedge bioMajoy('Mary')) \;) \\
&\wedge \; (Bob = Jim - 1) \\
&\wedge \; (\; bioMajoy('Lisa') \vee bioMajoy('Mary') \;) \\
&\wedge \; (\; Lisa = 1 \vee Mary = 1 \;) \\
&\wedge \; (\; \forall x, y \in People, x \neq y \;) \\
&\wedge \; (\; \forall x \in People, x \in \mathbb{Z} \; \wedge \; x \geq 1 \; \wedge \; x \leq 4 \;) \\
&]
\end{aligned}
$$

Therefore, the axiomatization of this problem can be written as:

$$\exists \; Lisa, Bob, Jim, Mary, \; P(Lisa, Bob, Jim, Mary)$$