

Name: _____

Entry number: _____

There are 2 questions for a total of 10 points.

1. (5 points) Consider the following predicates:

1. $U(x)$: x is a hound.
2. $C(x)$: x is a cat.
3. $M(x)$: x is a mouse.
4. $O(x)$: x howls at night.
5. $H(x, y)$: x has y .
6. $L(x)$: x is a light sleeper.

Express each of the statements using quantifiers and the predicates given above. Use the domain as the set of all living creatures.

| | Statement | Quantified expression |
|-------|---|-----------------------|
| S_1 | All hounds howl at night. | |
| S_2 | Anyone who has any cats will not have any mice. | |
| S_3 | Light sleepers do not have anything which howls at night.. | |
| S_4 | John has either a cat or a hound. | |
| S_5 | If John is a light sleeper, then John does not have any mice. | |

2. (5 points) Consider the quantified expressions S_1, \dots, S_5 obtained in the previous problem. Use the expressions obtained in the previous problem to replace S_1, \dots, S_5 below and then determine whether it makes a valid argument form. Explain your answer. (*If your answer is "yes", then you need to show all steps while using rules of inference*)

$$\begin{array}{l}
 S_1 \\
 S_2 \\
 S_3 \\
 S_4 \\
 \hline
 \therefore S_5
 \end{array}$$

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