

CSE 352 Artificial Intelligence
Homework 4, Part 2
10pts

Problem 1 (3pts)

PROVE: For any predicates $A(x)$, $B(x)$, the formula
 $((\forall x A(x) \cup \forall x B(x)) \Rightarrow \forall x (A(x) \cup B(x)))$ is a predicate tautology.

Use definition: $\forall x A(x) = \text{T}$ iff $\{x \in X : A(x)\} = X$, $\forall x A(x) = \text{F}$,
otherwise, where $X \neq \emptyset$.

Problem 2 (3pts)

Write the negation of the following statement in such way that the result
does not contain the negation connective. (Remember to translate from
restricted domain quantifiers to $\forall x$, $\exists x$.)

$$\neg \exists (x \in N \cup x > 0)(x + 1 = 3 \Rightarrow x = 4)$$

Problem 3 (4pts)

PROVE: The following argument is valid/not valid.

Some birds can sing. All yellow birds sing. HENCE: Some birds are yellow.

1. Define your predicates (in $X \neq \emptyset$). (1pt)
2. Write corresponding logic formulas (remember to translate from restricted domain quantifiers to $\forall x, \exists x$.) (1pts)
3. SOLVE using definitions:
 $\forall x A(x) = \text{TRUE}$ iff $\{x \in X : A(x)\} = X$
 $\exists x A(x) = \text{TRUE}$ iff $\{x \in X : A(x)\} \neq \emptyset$
and Ven-Diagrams. (2pts)