Predicate Logic

N° 1. Translate as precisely as possible the following sentences into predicate logic. Explain the interpretation of non logical constants when it is not obvious. In case of ambiguity, propose as many formulae as necessary.

(1)   a.   All superheroes had a difficult time.
     b.   To succeed, Akim has to read a book from all the faculty members.
     c.   A child is confident only if no adult lies to him.
     d.   Joaõ spoke to exactly two people.
     e.   Il a tramp enter a house and finds it empty, he settles there.
     f.   All the newspapers which don't have readers will disapear if they don't find a buyer.
     g.   Either everyone takes a drink, or no one does.
     h.   Paul hate people who don't like anyone but him.

N° 2. For each of the following formulae, propose a natural English sentence having the same truth conditions.
$F(x) = x$ is a farmer, $O(x, y) = x$ owns y, $B(x, y) = x$ beats y, $S(x, y) = x$ speaks to y, $j =$ Joe, $m =$ Max, $B(x, y) = x$ believes y, $H(x) = x$ is human, $D(x) = x$ is a donkey.

(2)   a. $\forall x \forall y((F(x) \wedge O(x, y)) \rightarrow B(x, y))$
     b. $(\neg S(j, m) \rightarrow \forall x(x \neq j \rightarrow \neg S(j, x)))$
     c. $\neg \forall x((H(x) \wedge \forall y(H(y) \rightarrow B(y, x))) \rightarrow B(m, x))$
     d. $\forall x(F(x) \rightarrow \neg \exists y(D(y) \wedge O(x, y)))$

N° 3.

1. Translate the following sentences into predicate logic.

   (3)   a.   John owns everything he has not lost.
        b.   John has not lost 1 million dollars.
        c.   John owns one million dollars.

2. Analyze the syllogism going from the conjunction of (3-a) and (3-b) to the conclusion (3-c). Explain where the problem lies.

Assignment #4: due December, 15