

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. Every politician is rejected by some voters.
 - b. Alex is upset as soon as everyone is noisy.
 - c. A child is confident only if no adult lies to him.
 - d. The moon has exactly two satellites.
 - e. When a problem is solved by all students, it should be suppressed.
 - f. All the newspapers which don't have readers will disappear if they don't find a buyer.
 - g. Either everyone takes a drink, or no one does.
 - h. Someone who refuses that everybody loves her should consult a doctor.

N° 2. Construct an analysis of *all but one* in terms of \forall , \exists , $=$, and propositional connectives, and show how (2) would be analysed under your proposal.

- (2) All but one poet hated himself.

N° 3. In natural language (and also in science), discourse often has changing domains. Therefore it is interesting to study what happens to the truth of formulas in a model when the model undergoes some transformation. Let us call *persistent* a formula when its truth is not affected by enlarging the models with new objects. Which of the following formulae are generally persistent?

- (3)
- a. $\exists x Px$
 - b. $\forall x Px$
 - c. $\exists x \forall y Rxy$
 - d. $\neg \forall x \forall y Rxy$