Theorem Proving (List 4): Non-Ground Superposition

Deadline: 13.04.2016

1. Consider the following, unsatisfiable, set of first-order formulas:

$$\forall xy \; R(x,y) \to \exists z \; R(x,z) \land R(z,y)$$
$$\forall x \; \neg R(x,x)$$
$$\exists xy \; R(x,y) \land \forall z \; z \approx x \lor z \approx y$$

   Transform this problem into clauss.

2. Refute the clause set, using superposition, negative selection, and a KBO.

3. Transform the following set of formulas, which is also unsatisfiable, into clauses:

$$\forall xy \; N(x) \land S(x,y) \to N(y)$$
$$\forall xy \; S(x,y) \to x \not\approx y$$
$$\forall x \; N(x) \to \exists y \; S(x,y)$$
$$\exists x \; N(x) \land \forall y \; N(y) \to x \approx y$$

4. Refute the clause set, using superposition, negative selection, and KBO.