

Math 557 – Homework #3

October 12, 2005

1. Using the predicates Sx (“ x is a set”) and Exy (“ x is a member of y ”), translate the following into a sentence of the predicate calculus.

There exists a set whose members are exactly those sets which are not members of themselves.

Use an unsigned tableau to test your sentence for *consistency*, i.e., satisfiability.

2. Using the predicates Sx (“ x is Socrates”), Hx (“ x is a man”), Mx (“ x is mortal”), translate the following argument into a sentence of the predicate calculus.

Socrates is a man. All men are mortal. Therefore, Socrates is mortal.

Use an unsigned tableau to test whether the argument is valid.

3. Using the predicates Sx (“ x can solve this problem”), Mx (“ x is a mathematician”), Jx (“ x is Joe”), translate the following argument into a sentence of the predicate calculus.

If anyone can solve this problem, some mathematician can solve it. Joe is a mathematician and cannot solve it. Therefore, nobody can solve it.

Use an unsigned tableau to test whether the argument is valid.

4. Using the same predicates as above, translate the following argument into a sentence of the predicate calculus.

Any mathematician can solve this problem if anyone can. Joe is a mathematician and cannot solve it. Therefore, nobody can solve it.

Use an unsigned tableau to test whether the argument is valid.

5. Use an unsigned tableau to test $\exists x (Px \Rightarrow \forall y Py)$ for logical validity.