# Math 260AB - Introduction to Mathematical Logic

**Winter and Spring 2012**

Instructor: Sam Buss

**Homework VIII. Due: Wednesday, May 9**

General instructions for all homeworks: Proofs are not required unless the problem asks for a proof.

**1.** Prove that $Q \nvdash (\forall x)(\forall y)(x + y = y + x)$.

**2.** Choose two of the items (b)-(k) on pages 85-86 of the Handbook article, choosing at least one that will require using induction. Expand the arguments presented there to give a careful proof that $PA$ (or if possible, $Q$) can prove your two items. Be especially clear about what formulas are used for induction. Do the induction formulas have side parameter variables? What are is the quantifier complexity of the induction formula(s).

**3.** Prove that $Q$ proves that the complete induction principle for $A(x)$ implies the induction principle for $A(x)$.