Math 114, HW 5

Due Friday, May 15

This homework is shorter than it otherwise would be because of the midterm on May 15th. You are strongly encouraged to do ALL problems in sections 2.1, 2.2, and 2.4 in preparation for the exam. Note that the first half of section 2.5 (the soundness theorem) will also be included on the exam.

1. Given an example of an axiom from each axiom group.

2. Provide a deduction (the whole thing, not just a proof that one exists) of $\forall x(\alpha \to \beta) \to \alpha \to \forall x\beta$ where x does not occur free in α.

3. Prove that there is a deduction of $\exists x(Dx \to \forall yDy)$.

4. Give a formula ϕ such that:

   - $\phi \vdash\dashv \exists y(Pxy \to \forall zRxyz)$
   - fyz is substitutable for x in ϕ

5. Prove that there is no deduction of $\forall x\exists yPxy \to \exists y\forall xPxy$.