# CS-661 AI Assignment 6

1. Consider the following rewrite system:

   - the symbols are

     $\mathbf{p}$, $\mathbf{q}$ and $-$

   - for notational simplicity we will use $x$, $y$ and $z$ to represent any number of consecutive $-$s

   - the following is an axiom schema

     $\forall x \qquad x\mathbf{p} - \mathbf{q}x-$

   - the following is the sole production rule

     $x\mathbf{p}y\mathbf{q}z \implies x\mathbf{p}y - \mathbf{q}z-$

   Derive some theorems.
   Can you discover a semantic interpretation for this system? Is there a second equally plausible interpretation?

2. In the lecture we discussed that **AND** $\wedge$, **OR** $\vee$ and **NOT** $\neg$ are a sufficient set of logical operators for propositional logic. What are the representations of all 16 two-variable boolean functions in terms of these operators?

3. Prove that **NAND** and **NOR** are sufficient in themselves.