

Harvey Mudd College  
Computer Science 80  
Logic for Computer Science  
Fall Semester 2002

Assignment #3 – Propositional Logic: Natural Deduction  
Due 11:00am, Monday November 4, 2002

Give Natural Deduction proofs of each of the following formulas. That is, give a Natural Deduction proof tree with the given formula as its conclusion, and no undischarged assumptions. (Note, brackets are used in place of parentheses in some positions to make the formula nesting structure clearer):

1.  $((p \wedge q) \Rightarrow r) \equiv [p \Rightarrow (q \Rightarrow r)]$
2.  $((p \Rightarrow q) \Rightarrow [(r \Rightarrow p) \Rightarrow (r \Rightarrow q)])$
3.  $((p \Rightarrow q) \Rightarrow p) \Rightarrow p$
4.  $((p \Rightarrow r) \equiv [\neg(p \wedge (\neg r))])$
5.  $[(p \Rightarrow r) \equiv ((\neg p) \vee r)]$