Logic 1, WS 2004. Homework 2, given Oct 14, due Oct 21

1. Write the truth tables for:
   (a) $(\neg(P \vee Q)) \vee (\neg Q)$
   (b) $(P \Rightarrow Q) \Rightarrow (Q \Rightarrow P)$
   (c) $(\neg P) \wedge (\neg(P \Rightarrow Q))$

2. Prove the following equivalences using equivalent rewriting (e.g. by transforming both sides into conjunctive or disjunctive normal form):
   (1) $P \wedge Q \wedge (\neg P \vee \neg Q) \equiv \neg P \wedge \neg Q \wedge (P \vee Q)$
   (2) $P \vee (P \Rightarrow (P \wedge Q)) \equiv \neg P \vee \neg Q \vee (P \wedge Q)$

3. Prove the following formula using the natural style inferences which you find appropriate, in a style similar to our natural style proofs from the lecture:
   $((A \vee B) \Rightarrow C) \Leftrightarrow ((A \Rightarrow C) \wedge (B \Rightarrow C))$