Homework 2

1. Prove that the following arguments are valid. You may use only the following rules: A (the rule of assumptions), MPP, MTT, DN, &I, &E, $\vee$I, and CP (conditional proof). You must list dependency numbers for each line of your proof. [*None of these proofs require RAA. A proof that uses RAA will get no points.*]
   (a) $P \to Q \vdash (Q \to R) \to (P \to R)$
   (b) $P \to (P \to Q) \vdash P \to Q$
2. Prove that the following argument is valid. You may use only the following rules: A (the rule of assumptions), MPP, MTT, DN, &I, &E, $\vee$I, CP (conditional proof), and $\vee$E ($\vee$ elimination). [*None of these proofs require RAA. A proof that uses RAA will get no points.*]
   (a) $P \to Q, R \to S \vdash (P \vee R) \to (Q \vee S)$
3. Prove that the following arguments are valid. You may use any of the rules of inference that we have introduced, including RAA, i.e., any of the rules in Chapter 1 of Lemmon's book. (Note: if a turnstile $\vdash$ has nothing on the left, then the final line of your proof should have *no* dependency numbers.)
   (a) $\neg P \vee Q \vdash P \to Q$
   (b) $\vdash ((P \to Q) \to P) \to P$
   (c) $\vdash (P \to Q) \vee (Q \to P)$