Homework 3 – Part B.

1. Prove that the following arguments are valid. You may use any of the Stage 1 rules of inference (MPP, MTT, DN, &I, &E, ∨I), plus the Rule of Assumptions (A) and Reductio ad Absurdum (RAA).

   (a) (1) \( \neg(P \lor Q) \) \quad / \quad \neg P \& \neg Q

   (b) (1) \( \neg P \rightarrow Q \) \quad / \quad P \lor Q

2. Prove that the following arguments are valid. You may use any of the Stage 1 rules of inference plus the Rule of Assumptions (A) and ∨-Elimination (∨E).

   (a) (1) \( R \lor S \)
   (2) \( \neg P \rightarrow \neg R \)
   (3) \( S \rightarrow Q \) \quad / \quad Q \lor P

   (b) (1) \( P \lor Q \)
   (2) \( P \lor R \) \quad / \quad P \lor (Q \& R)

3. Prove that the following arguments are valid. You may use any of the rules of inference that we have learned.

   (a) (1) \( (P \rightarrow Q) \lor (P \rightarrow R) \) \quad / \quad P \rightarrow (Q \lor R)

   (b) (1) \( (P \rightarrow Q) \rightarrow Q \) \quad / \quad P \lor Q