Discrete Structures, Fall 2014, Problem Set 3

You must write the solutions to these problems legibly on your own paper, with the problems in sequential order, and with all sheets stapled together.

1. Complete the following proofs using the method described in class (line numbers, rule justifications, etc).

   (a) P1: $\exists w \in D \sim Q(w) \lor P(w)$
   P2: $\forall x \in D \; Q(x) \lor R(x)$
   P3: $\forall y \in D \; R(y) \to P(y)$
   Prove: $\exists z \in D \; P(z)$

   (b) P1: $\forall w \in D \sim R(w) \land Q(w)$
   P2: $\forall x \in D \; Q(x) \to \sim(P(x) \land S(x))$
   P3: $\forall y \in D \; (T(y) \to R(y)) \to P(y)$
   Prove: $\forall z \in D \; S(z) \to T(z)$

   (c) P1: $\forall w \in D \sim L(w)$
   P2: $\forall x \in D \; S(x) \to (R(x) \land T(x))$
   P3: $\forall y \in D \; [L(y) \to \sim S(y)] \to [R(y) \to L(y)]$
   Prove: $\forall z \in D \sim S(z)$