(a) You have to write a program that accepts a propositional formula $\phi$ and returns an interpretation that falsifies $\phi$. Describe the algorithm you would employ in each of the following circumstances:

(i) $\phi$ can be expected to contain many occurrences of the $\leftrightarrow$ connective. 

(ii) $\phi$ will be delivered in disjunctive normal form.

(b) Let $S$ be a set of propositional clauses, each of which contains a negative literal.

(i) Show that applying the resolution procedure to $S$ will never generate the empty clause.

(ii) Describe a model that satisfies $S$.

(c) Prove or disprove the sequent $\Box \Diamond (P \lor Q) \Rightarrow (\Box \Diamond P) \lor (\Box \Diamond Q)$ of S4 modal logic.