Problems on sets

1. For each of the following, give an example of sets A and B such that, if possible,

   (a) $A \subset B$

   (b) $A \not\subseteq B$

   (c) $A \in B$

   (d) $A \notin B$

   (e) $A \subset A$

   (f) $A \not\subseteq A$

   (g) $A \in A$

   (h) $A \notin A$

2. For each of the following, either prove the given statement or give a counterexample to show it is false

   (a) If $C \subseteq A$ and $C \subseteq B$, then $C \subseteq A \cup B$.

   (b) If $A \subseteq C$ and $B \subseteq C$, then $A \cup B \subseteq C$.

   (c) If $C \subseteq A$ and $C \subseteq B$, then $C \subseteq A \cap B$.

   (d) If $A \subseteq C$ and $B \subseteq C$, then $A \cap B \subseteq C$.

   (e) If $A \cup B = A \cup C$, then $B = C$.

   (f) If $A \cap B = A \cap C$, then $B = C$.