1) Determine whether each of the following is true or false.

     a) $\varnothing \subseteq \varnothing$
     b) $\varnothing \in \varnothing$
     c) $\varnothing \in \{\varnothing\}$
     d) $\varnothing \subseteq \{\varnothing\}$
     e) $\varepsilon \subseteq \{\varepsilon\}$
     f) $\varepsilon \in \{\varepsilon\}$
     g) $\{\varepsilon\} = \varnothing$
     h) $\{a, b\} \in \{a, b, \{a, b\}\}$
     i) $\{a, b\} \subseteq \{a, b, \{a, b\}\}$
     j) $\{a, b\} \subseteq 2^{\{a, b, \{a, b\}\}}$
     k) $\{\{a, b\}\} \in 2^{\{a, b, \{a, b\}\}}$

2) Give three positive and three negative examples (if possible) of strings in the following languages, where $\Sigma = \{a, b\}$. In other words, list 3 strings that are in the language (positive) and three strings that are not in the language (negative).

     a) $\{w : w$ has an even length$\}$
     b) $\{w : w$ contains either the substring *abbb* or the substring *aa*$\}$
     c) $\{w : w$ has twice as many *a*'s as *b*'s$\}$
     d) $\{w : w$ contains only *b*'s$\}$
     e) $\{w : w$ is a palindrome$\}$
     f) $\{w : w$ does not contain the substring *ba*$\}$

3) For each of the languages in question 2, determine whether the empty string, ε, is in the language.