1. Let $A$, $B$ and $C$ be sets. Show that
   
   (a) $(A - B) - C \subseteq A - C$

   (b) $(B - A) \cup (C - A) = (B \cup C) - A$

2. If $A$, $B$, $C$ and $D$ are sets, does it follow that $(A \otimes B) \otimes (C \otimes D) = (A \otimes C) \otimes (B \otimes D)$?

3. Let $\Sigma = \{0, 1\}$. For each of the following languages, give the state diagram for a DFA that recognizes it. You can build the DFA in JFLAP (www.jflap.org) and test it out.

   - $L_1 = \{w \mid w$ begins and ends with an even number of 1’s\}
     Examples in $L_1$: 110101111, 010, 0, 11, 11001101011, Examples not in $L_1$: 101, 1, 1101, 111010111, 01
   
   - $L_2$ is the language that consists of all strings $w$ such that $w$ ends in an odd number of 1’s and $w$ contains an even number of 0’s.
     Examples in $L_2$: 1010111, 001, 1, Examples NOT in $L_2$: 01001, 0011
   
   - $\Sigma^*0\Sigma^*1\Sigma^*0\Sigma^*$ Examples in $L$: 010, 000110, 11011001. Examples not in $L$: 111, 011, 00011.
   
   - $L = \{w \mid w$ is a binary number divisible by 2, given least significant digit first\}$.
     Examples in $L$: 0, 01, 001, 010, 01011. Examples not in $L$: 1, 111, 101.