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.

   - $L_1 = \{w: w$ begins and ends with an even number of 1’s$\}$

   - $L_2$ 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.

   - $\Sigma^*0\Sigma^*1\Sigma^*0\Sigma^*$ Examples in $\mathcal{L}$: 010, 000110, 11011001. Examples not in $\mathcal{L}$: 111, 011, 00011.

   - $\mathcal{L} = \{w \mid w$ is a binary number divisible by 2, given least significant digit first$\}$. Examples in $\mathcal{L}$: 0, 01, 001, 010, 01011. Examples not in $\mathcal{L}$: 1, 111, 101.