Formal Languages and Automata Theory, SS 2019. Homework 7 (due Week 9)

1. Construct the ε-NFAs for the following r.e. Then transform them into DFAs.

   (a) $a|b|c$
   (b) $io|ma$
   (c) $(a|b)b^*$
   (d) $a^*b|c^*$
   (e) $(0|1)^*01(0|1)^*$

2. Specify the languages represented by the following regular expressions:

   (a) $(11|0)^*(00|1)^*$;
   (b) $(1|01|001)^*(\varepsilon|0|00)$;
   (c) $10|(0|11)0^*1$;
   (d) $((0|1)(0|1))^*$;
   (e) $01^*|1$;
   (f) $((11)^*|101)^*$.

3. Build the ε-NFAs that recognize the languages specified at the previous exercise.

4. Write regular expressions for the following languages:

   - $L = \{w|\text{strings of } 0's \text{ and } 1's \text{ containing at least one symbol 1}\}$
   - $L = \{w|\text{strings of } 0's \text{ and } 1's \text{ containing at least one symbol}\}$
   - $L = \{w|\text{strings of 0's and 1's which end in 1}\}$
   - $L = \{ana, ani, ina, ini\}$
   - $L = \{w|\text{strings of 0's and 1's which end in 1}\}$

5. Determine the languages denoted by the following regular expressions:

   - $(a|i)n(a|i)$
   - $(0|1)(0|1)^*$
   - $01^*|1$
   - $(11)^*1$
   - $(1|0)^*0(0|1)$