Formal Languages and Automata Theory, SS 2020. Homework 7 (due Week 9)

1. Consider the following ε-NFA:

	ε	a	b	c
$\to p$	$\emptyset$	$\{p\}$	$\{q\}$	$\{r\}$
q	$\{p\}$	$\{q\}$	$\{r\}$	$\emptyset$
$^*r$	$\{q\}$	$\{r\}$	$\emptyset$	$\{p\}$

   (a) Compute the ε-closure of each state.

   (b) Give all strings of length three or less accepted by the automaton.

   (c) Convert the automaton to a DFA.

2. Repeat the previous exercise for the following ε-NFA.

	ε	a	b	c
$\to p$	$\{q, r\}$	$\emptyset$	$\{q\}$	$\{r\}$
q	$\emptyset$	$\{p\}$	$\{r\}$	$\{p, q\}$
$^*r$	$\emptyset$	$\emptyset$	$\emptyset$	$\emptyset$

3. Write regular expressions for the following languages:

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

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

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