Problem Set 0

Due Monday 11 February 2019

Problem 0

In each part below the given lanugage is the intersection of two simpler languages. In each part construct DFA's that recognize the simpler languages and then combined these DFA's to obtain a DFA recognizing the given language. In each part, $\Sigma = \{a, b\}$.

(a) $\{w \mid w$ has an even number of a's and one or two b's$\}$.
(b) $\{w \mid w$ starts with an a and has at most one $b\}$.

Problem 1

In each part below, the given language is the complement of a simpler language. In each part, construct a DFA for the simpler language and use it the construct a DFA for the given language. In each part $\Sigma = \{a, b\}$.

(a) $\{w \mid w$ is not in $a^*b^*\}$.
(b) $\{w \mid w$ is any string not in $a^* \cup b^*\}$.

Problem 2

Give diagrams of DFA's recognizing the languages given in each part below. In each part $\Sigma = \{0, 1\}$.

(a) $\{w \mid w$ contains the substring 0101$\}$.
(b) $\{w \mid w$ starts with 0 and has odd length or it starts with 1 and has even length$\}$.

Problem 3

For each part below provide a diagram of an NFA with the specified number of states that recognizes the given language. Here $\Sigma = \{0, 1\}$.

(a) The language given in Problem 2 (a) with five states.
(b) $\{w \mid w$ contains an even number of 0's or it contains exactly two 1's$\}$ with six states.

Problem 4

Convert the NFA diagrammed below into a DFA.