1. 

(i) Which of the following strings are accepted by the NFA which appears above?

(a) 001101  
(b) 0001  
(c) 11  
(d) 110100  
(e) 1111  
(f) 00100

(ii) For each regular expression below, state whether or not it designates the language accepted by the finite state machine.

(a) \((0+1)^*11(0+1)^*\)  
(b) \((01)^*11(0+1)^*\)  
(c) \((01)^*11(01)^*\)

2. (i) Draw the DFA that corresponds to the following transition function. The alphabet is \(\{a, b\}\), the initial state is \(A\) and the only accepting state is \(B\).

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(ii) Which of the following strings are accepted by the DFA given in (i)?

(a) \(aaa\)  
(b) \(aaab\)  
(c) \(bbab\)  
(d) \(baba\)

(iii) Describe the language accepted by the machine in (i).

(iv) Find a regular expression which designates the language found in (iii).

3. Construct a DFA that accepts only those strings of lower case letters which end in “ing”.

4. Given regular expressions \(r_1 = ab^*\) and \(r_2 = a^*b\).

(i) Find NFA’s \(M_1\) and \(M_2\) which accept the languages \(L(r_1)\) and \(L(r_2)\).

(ii) Describe how to construct new NFA’s (using \(M_1\) and \(M_2\)) which accept the languages

(a) \(L(r_1 + r_2)\),  
(b) \(L(r_1r_2)\),  
(c) \(L(r_1^*)\).
1. Which of the following strings are accepted by the NFA which appears above?

(i) (a) 001101   (b) 0001   (c) 11
    (d) 110100   (e) 1111   (f) 00100

(ii) For each regular expression, state whether or not it designates the language accepted by the finite state machine.

(a) $0^*(0 + 1)1(0 + 1)^*$
(b) $0^1(00^*1)^*(0 + 1)^*$
(c) $(0 + 10)^*11(0 + 1)^*$

2. (i) Construct an NFA which accepts the language $L$ over the alphabet $\{0, 1\}$ where

(a) $L$ consists of all strings which end in 010 and do not contain any other occurrences of the sequence 010.

(b) $L$ consists of all strings which do not contain the sequence 010.

(ii) Write down a regular expression which designates the language in part (i)(a).