CS 181 - Homework 2

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Section 1B

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Problem 1
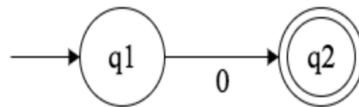
a

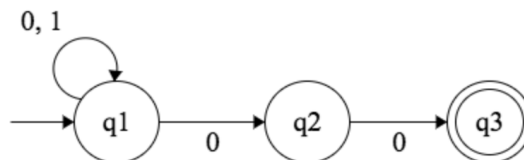Figure 1: NFA for the language {0} with 3 states

b

Figure 2: NFA for the language of strings that end in 00 with three states
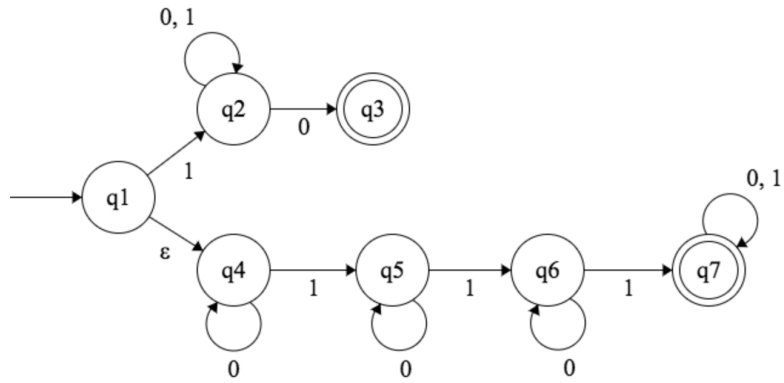
Problem 2

a

Figure 3: NFA for binary strings that begin with a 1 and end with a 0; or contain at least three 1s;
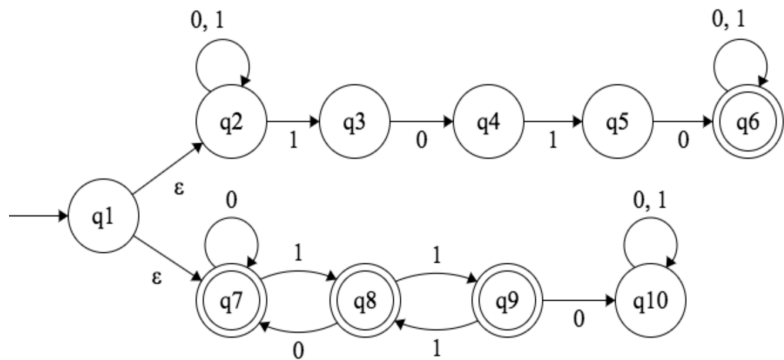
b

Figure 4: NFA for binary strings that contain the substring 1010 or do not contain the substring 110
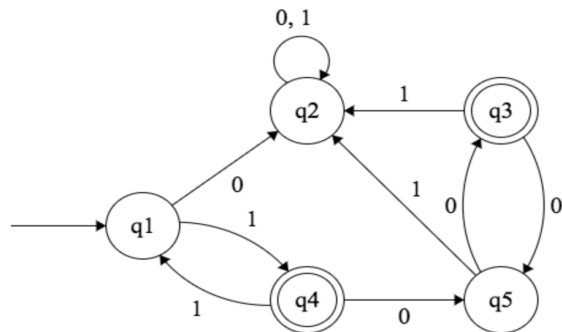
Problem 3

Figure 5: L = {w: w contains an even number of 0s and an odd number of 1s and does not contain the substring 01}.
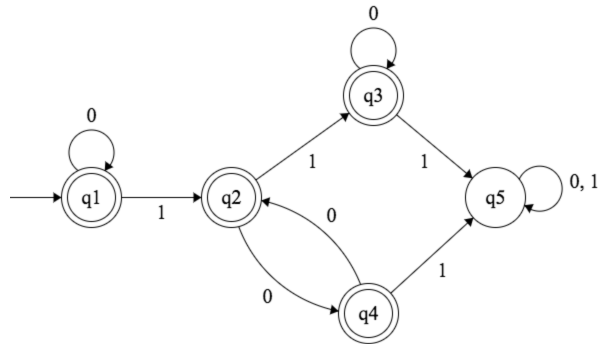
Problem 4

Figure 6: L is the language of all strings over {0,1} that do not contain a pair of 1s that are separated by an odd number of symbols

Problem 5

No, because with NFA's the word can fail by entering a null state. This means that we can have a situation where both the original and the compliment can fail due to not accepting a certain input. In the counterexample given below, we see that both regular languages fail on w = 0.

Figure 7: Counterexample to Problem 5

Problem 6

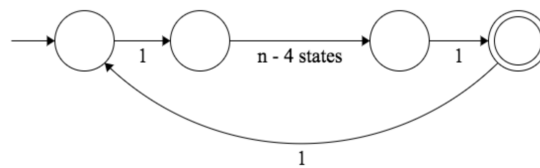We can show that L_n is regular by showing that any FA exists.

Figure 8: NFA for L_n

Problem 1.48 from Sipser

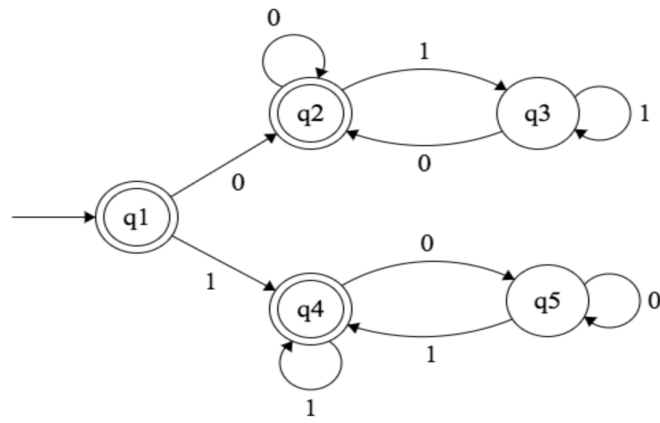To show that the language is regular we can find a DFA for the language.

Figure 9: DFA for where D: {w: w contains equal number of 01 and 10}