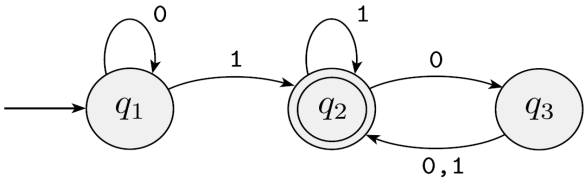
CSE 445 – Assignment 1
Submission Deadline: March 06, 2017, 3:00 pm
(Total 6 questions)

Q.1. (**15 points**) A state diagram (finite automation) of a machine M_1 is shown below, where $\sum = \{0, 1\}$.



(1) (1 point) How many number of states are there in machine M_1.

(2) (1 point) Name the start state.

(3) (1 point) Name the accepting (final) state(s).

(4) (1 point) Is it a DFA? If not then why.

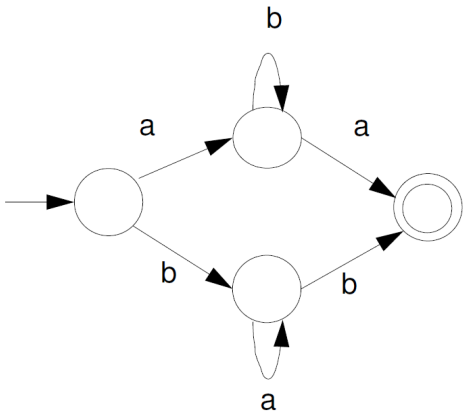
(5) (6 points) Which of the following input string is accepted by M_1. Write yes (accepts) or no (doesn't accept) in front of the string.

input string	yes/no
'1'	
'10'	
'1100'	
'101010101'	
'01100110000011000111'	
'000111100111100'	
'0011000'	

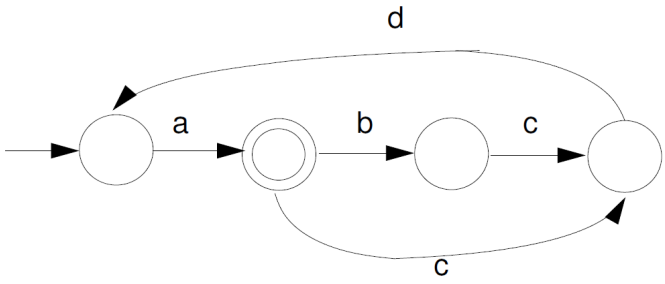
(6) (5 points) Describe, in English (examples in Q.3.), the language consisting of all strings that M_1 accepts.

Q.2. (**10 points**) Write regular expressions that recognizes the following FAs.

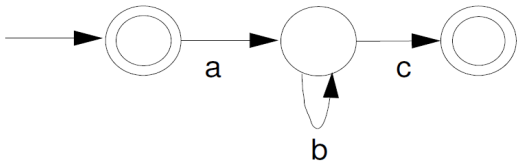
(1) (4 points)



(2) (4 points)



(3) (2 points)



Q.3. (**20 points**) Construct DFAs for the following languages, where $\sum$ = {a, b}.

(1) (6 points). `{s | s has even number of a's}`

(2) (7 points). `{s | s has odd number of a's and ends with b}`

(3) (7 points). `{s | s has at least three a's}`

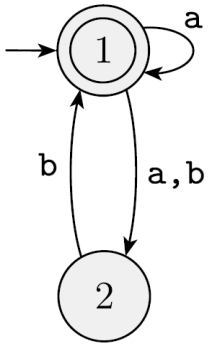
Q.4. (**15 points**) Construct DFAs for the following expressions.

(1) (7 points). `(a | bc*d)+`

(2) (8 points). `((0 | 1)* (2 | 3)+) | 0011`

Q.5. (**20 points**)

(1) (6 points). Convert the following NFA to DFA using the subset construction.



(2) (7 points). Construct NFA for `(a | b)*a(a | b)`

(3) (7 points). Convert the NFA in part (2) into a DFA using the subset construction.

Q.6. (**20 points**) Write a program in JAVA that capitalizes all comments in a C program. For example the following C program:

```
/* Single line */
int test(int x, int y)
{
        /*
        Multiple line
        comments
        */
        return (x+y+1);
}
```

Should be transformed to:

```
/* SINGLE LINE */
int test(int x, int y)
{
        /*
        MULTIPLE LINE
        COMMENTS
        */
        return (x+y+1);
}
```

RULES:
1. Obey honor code principles.
2. Read your homework carefully and follow the directives about the I/O format (data file names, file formats, etc.) and submission format strictly. Violating any of these directives will be penalized.
3. Obey coding convention.
4. Your **online submission** should include the following file and NOTHING MORE (no data files, object files, etc):
   A01_<Firstname>_<Lastname>_<student number>_capitalize.java
   Do NOT compress the file you submit.
5. Do not use non-English characters in any part of your homework (in body, file name, etc.).
6. Deliver the **printout** (Q1 – Q.5 only) of your work on the last submission date before the class.