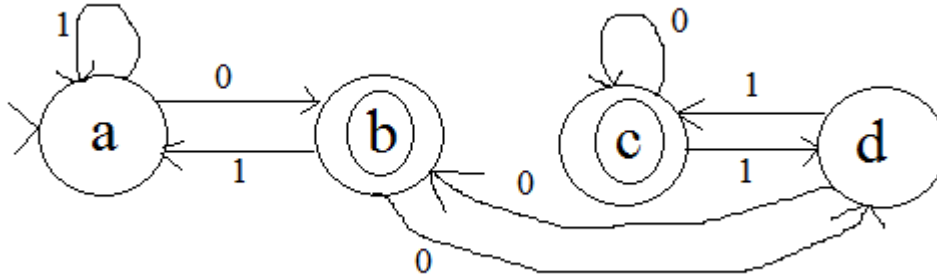**Date: 9/8/2015**

Name: _____

1) (15 pts) Write out the formal description of the DFA drawn below:

2) Determine a regular expression for the following two languages over the alphabet $\{0, 1\}$.

a) (6 pts) The set of strings of length 2 or greater that start and end with the same character.

b) (9 pts) The set of strings that do not contain any occurrence of two or more consecutive 0s. (Examples of strings in the language are 0, 10, 1101 and 0101110. But 100, 0111001 and 00 are not in the language.)

3) (20 pts) Convert the NFA described formally below to an equivalent DFA. Please draw your DFA, labeling all parts of the formal definition of a DFA clearly. Please label your states using the form q_{abc}, where q_a, q_b, q_c are the set of states from the original NFA being represented.

$Q = \{q_0, q_1, q_2\}$, start state $= q_0$, $\Sigma = \{0, 1\}$, $F = \{q_1\}$

$\delta(q_0, 0) = \{q_0, q_1\}$
$\delta(q_1, 1) = \{q_2\}$
$\delta(q_1, \varepsilon) = \{q_2\}$
$\delta(q_2, 1) = \{q_0, q_2\}$
$\delta(q_2, 0) = \{q_2\}$
$\delta(q_0, 1) = \delta(q_0, \varepsilon) = \delta(q_1, 0) = \delta(q_2, \varepsilon) = \emptyset.$