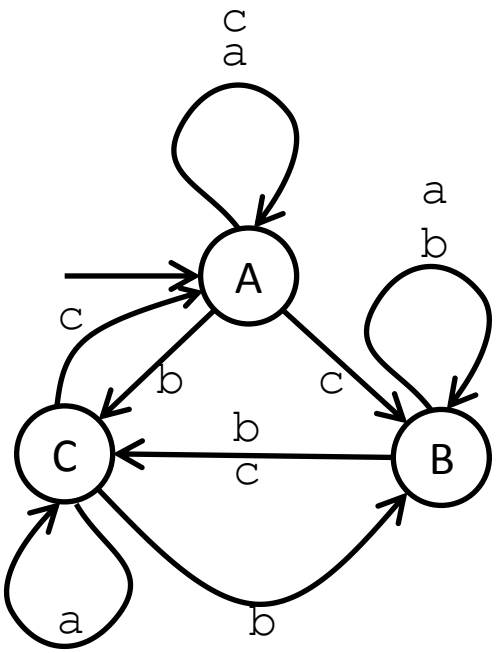
Name _____ Discrete II, Big Quiz 3, Spring 2017

1) Given the finite state machine (I, O, S, f, g, σ) with $I = \{a, b, c\}$, $O = \{0,1,2\}$, $S = \{A, B\}$, $\sigma = A$, and f, g as described in the table below, draw the corresponding transition diagram. (10 points)

	f			g		
$S\backslash I$	a	b	c	a	b	c
A	A	B	A	0	0	0
B	B	B	A	0	1	2

2) Given the finite state automata shown below, is the string "abcabcbbb" accepted? Show your work or justify your answer. (5 points)



3) Given the grammar $G = (N, T, P, \sigma)$ with $N = \{A\}$, $T = \{a, b, d\}$, $\sigma = A$, and P consisting of the productions below, give a derivation to show that $abab \in L(G)$. (10 points)

$$A \to a|b|abA|bA$$
$$aA \to A$$
$$bA \to A$$

4) Given the grammar $G = (N, T, P, \sigma)$ with $N = \{A, B\}$, $T = \{a, b, d\}$, $\sigma = B$, and P consisting of the productions below, create the transition diagram for a nondeterministic finite state automata that has the same language. (10 points)

$$A \rightarrow a|bA$$
$$B \rightarrow b|aB|bA$$

5) What is the langauge created by G in the previous question? Describe it either mathematically or in words. You may use regular expressions if you're familiar with them. (5 points)

6) Given the infix expression below, create the binary expression tree that represents it. (5 points)

$$3 \cdot 2 + 4 \cdot 5$$

7) Evaluate the postfix expression below. (5 points)

$$65 + 26 - \div$$