CS 3120 Quiz Day 1

This packet contains the quizzes for this quiz day. This **cover sheet** is here to provide instructions, and to cover the questions until the quiz begins. **do not open this quiz packet** until your proctor instructs you to do so.

You will have the 1 hour to complete these quizzes. Each quiz is two pages (front and back of one sheet of paper) worth of questions. Make sure to **write your name and computing id at the top of each individual quiz**.

When you are finished, simply submit this packet at the front of the classroom.

This quiz is CLOSED text book, closed-notes, closed-calculator, closed-cell phone, closed-computer, closed-neighbor, etc. Questions are worth different amounts, so be sure to look over all the questions and plan your time accordingly. Please sign the honor pledge below.

In theory, there is no difference between theory and practice.
But, in practice, there is.

THIS COVER SHEET WILL NOT BE SUBMITTED. DO NOT PUT WORK YOU WANT GRADED ON THIS PAGE

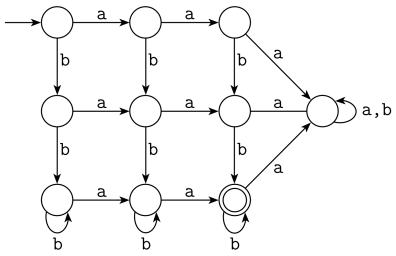
Quiz - Module 2: Regular Languages

Name _____

1. [8 points] Answer the following True/False questions.

*DFA*s can only have one accept state and *NFA*s can have more	**True**	**False**
If a *DFA* returns to a previously visited state, then the machine automatically *rejects*	**True**	**False**
The input to a *DFA* must be a finite length string	**True**	**False**
It is possible for an *NFA* to be in an infinite number of states at some single point in its computation	**True**	**False**
Every *NFA* has an equivalent *DFA*	**True**	**False**
Every *DFA* has an equivalent *NFA*	**True**	**False**
There are some regular languages that cannot be constructed using only union, concatenation, and star from other regular languages.	**True**	**False**
It is possible to find a regular language A and a non-regular language B, such that $A \cap B$ is regular	**True**	**False**

2. [2 points] Given the DFA below, write out in natural english what language is accepted. We do not want a regular expression here. Please write something like *Strings that contain...*



3. [2 points] Draw an *DFA* (not an NFA), with as few states as possible, for the following regular language (Note that $\Sigma = \{0, 1\}$):

$A = 0\Sigma^*0 \cup 1\Sigma^*1 \cup 0 \cup 1$

For these questions, you will explain in your own words each of the three conditions of the pumping lemma. Recall that the pumping lemma states that given a regular language A, there exists an integer p such that for any string $s \in A$ where $|s| \geq p$, there exists a way to partition s into three parts, $s = xyz$ such that three conditions hold. The questions below will remind you of these conditions and ask you to explain each one.

4. [2 points] Condition 1 states that for each $i \geq 0, xy^iz \in A$. Show how this condition works by applying it to a string of your choosing from the regular language $0^*1^*001^*0^*$.

5. [2 points] Condition 2 states that $|y| > 0$. The book states that this condition is required because otherwise the theorem is *trivially true*. Explain why this is the case in your own words.

6. [2 points] Condition 3 states that $|xy| \leq p$. Explain in your own words *why* this condition must hold. *Hint: Think about the DFA that accepts A*

7. [2 points] Suppose we change condition 3 to $|yz| \leq p$. Does this inequality still hold? Explain why or why not.