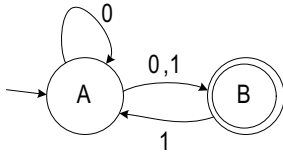


Quiz 2

Your name:

Answer all questions. Please write neatly. Please be careful—know that little or no credit will be given for wrong answers. Questions may be worth varying numbers of points.

1. Using the procedure shown in class, convert the following NFA into a DFA for the same language. Express your answer by neatly drawing the DFA. Label all states. Make sure to indicate the start state and final states. Don't try to "simplify" anything.



2. In mathematically precise language, state the *pumping lemma* for regular languages. I will start you off:

Let L be regular. Then there exists a number N , the pumping length, such that

3. **Circle** the correct answer. Then, in the space provided, briefly justify your response.
- (a) **True** or **False**: The language $\overline{(ab \cup c)^*}$ is regular.
 - (b) **True** or **False**: You can always convert a DFA into a regular expression, of roughly comparable size, for the same language.
 - (c) **True** or **False**: Every subset of a regular language is regular.
 - (d) **True** or **False**: Given a DFA M , we know a reasonably efficient procedure to find a *smallest* DFA for $L(M)$.
 - (e) **True** or **False**: Given an NFA M , we know a reasonably efficient procedure to find a *smallest* NFA for $L(M)$.
 - (f) **True** or **False**: If there's a 10-state NFA that accepts L then, for sure, there's a 100-state DFA that accepts L .
 - (g) **True** or **False**: There's a reasonably efficient procedure to decide if two DFAs accept the *same* language.
 - (h) **True** or **False**: Given $h: \Sigma \rightarrow \{0, 1\}^*$, define $h(L) = \{h(a_1) \cdots h(a_n) : a_1 \cdots a_n \in L\}$. Then $h((ab \cup c)^*)$ is regular.

That's all!