CMSC330 Spring 2016 Quiz #3

Name ______________________________

Discussion Time (circle one) 10am 11am 12noon 1pm 2pm 3pm

Discussion TA (circle one) Adam Anshul Austin Ayman Damien Daniel Jason Michael Patrick William

Instructions

• Do not start this quiz until you are told to do so.
• You have 15 minutes for this quiz.
• This is a closed book quiz. No notes or other aids are allowed.
• For partial credit, show all of your work and clearly indicate your answers.

1. (4 points) Write a context-free grammar for the following language. Example strings in this language include bbb, abc, and aaabbccc.

   \[ a^n b^m c^n, \quad n, m \geq 0 \]

   Answer

   \[ S \rightarrow aSc | B \]
   \[ B \rightarrow bB | \epsilon \]

   2 points for \( a^n c^n \).
   2 points for \( b^m \).
2. (6 points) Construct an NFA for the following regular expression: \((ab \mid b)^*\)

**Answer**

![Diagram of NFA](image)

**2 points** for ab.

**1 point** for b.

**1 point** for union.

**1 point** for kleene star.

**1 point** for correct start and end states.

**Full marks** if the NFA accepts the same set of strings as \((ab \mid b)^*\).
3. (6 points) Convert the following NFA to an equivalent DFA.

![NFA Diagram]

**Answer**

![DFA Diagram]

1 point for each numbered state.

1 point for having one start and at least one accepting state.

2 points for correct edges.

Full marks if the DFA accepts the same set of strings as the one above.
4. (4 points) Circle “Accept” if the NFA accepts the given string. Circle “Reject” otherwise.

Answer

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<td>Accept</td>
<td>Reject</td>
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1 point for each correct answer.