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## CS208 In-class Quiz 3 (Spring 2013)

Time: 30 mins

Date: Feb xx, 2013

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- *The exam is open book.*
  - *Be brief, complete and stick to what has been asked. If needed, you may cite results/proofs covered in class without reproducing them.*
  - *Do not copy solutions from others*
  - *Penalty for copying: FR grade (and you know we mean it!)*
1. *[10 marks]* Let  $\Sigma = \{0, 1\}$ . For every word  $w \in \Sigma^*$ , let  $N_0(w)$  and  $N_1(w)$  denote the count of 0s and 1s, respectively, in  $w$ . Let  $L$  be the language  $\{w \mid w \in \Sigma^*, N_0(w) > N_1(w) + 2, \text{ or } N_1(w) > N_0(w) + 2\}$ . Is  $L$  regular? If so, you must give an NFA/DFA that accepts  $L$  along with a brief explanation for your construction (answers without explanations will fetch no marks). If not, prove that  $L$  is not regular.
  2. *[10 marks]* Using the notation of the previous question, show that the language  $\{w \mid w \in (0 + 1)^*, N_0(w) > N_1(w)\}$  is not regular.