

Name: \_\_\_\_\_

## Quiz 4

Foundations of Computer Science  
Fall 2007

This quiz is open book, open notes. Credit: both questions are from Sipser (modified).

1. Give a context-free grammar for the following language with the alphabet  $\{0, 1\}$ .

$\{w \mid w \text{ starts and ends with the same symbol}\}$

2. Let  $G = (V, \Sigma, R, S)$  be the following grammar.  $V = \{S, T, U\}$ ;  $\Sigma = \{0, \#\}$ ; and  $R$  is the set of rules

$$\begin{aligned} S &\rightarrow T \mid U \\ T &\rightarrow 0T00 \mid \# \\ U &\rightarrow 0U000 \mid \# \end{aligned}$$

Describe  $L(G)$  in English and sketch a proof that it is not regular (feel free to use the other side of the paper).