CSE 311 Quiz Section: May 16, 2013

1. Regular Expressions

Express each of these sets using a regular expression:

a) The set of strings of one or more 0s followed by a 1

b) The set of strings of odd length

c) The set of strings not containing 000 and ending with a 1

d) The set of strings containing a string of 1s such that the number of 1s is equivalent to 2 mod 3, followed by an even number of 0s

2. Recursive Definitions and Structural Induction

Let S be the subset of the set of ordered pairs of integers defined recursively by: Basis Step: $(0,0) \in S$

Recursive Step: If $(a, b) \in S$, then $(a, b+1) \in S$, $(a+1, b+1) \in S$, and $(a+2, b+1) \in S$. a) List the elements of S produced by the first four applications of the recursive

definitions.

b) Use structural induction to show that $a \leq 2b$ whenever $(a, b) \in S$.

3. Context-Free Grammars

Find a context-free grammar for each of the following languages:

a) the set of all bit strings containing an even number of 0s and no 1s

b) the set of all bit strings containing ten or more 0s and no 1s

c) the set of all bit strings containing an odd number of 0s followed by an even number of 1s