

COSC 440 Review Questions
Final
Fall 2012

Give the DFA, NFA and RE for the language

$$B_n = \{a^k \mid \text{where } k \text{ is a multiple of } n, n \geq 1\}$$

Show that the language $A = \{w \mid w \text{ is not a palindrome}\}$ is not regular.

Give the CFG in CNF and PDA for the language that is the set of strings with more a's than b's.

Show that the language $A = \{0^n \# 0^{2n} \# 0^{3n} \mid n \geq 0\}$ is not context-free.

Give the single-tape, deterministic TM for the language $A = \{w \mid w \text{ contains twice as many 0s as 1s}\}$. Give the formal definition (you may use a finite automata to describe the transition function).

Let $A = \{\langle M \rangle \mid M \text{ is a DFA which doesn't accept any string containing an odd number of 1s}\}$. Show that A is decidable.

Prove that SAT is NP-Complete.

Prove that DOUBLE-SAT = $\{\langle \phi \rangle \mid \phi \text{ has at least two satisfying assignments}\}$ is in NP.

Prove that CONNECTED = $\{\langle G \rangle \mid G \text{ is a connected, undirected graph}\}$ is in P.