

COSC 440 – Theory of Computation
Exam #1 Review Questions
Fall 2008

- 1.) Is the language $\{w \mid \text{where } w \text{ has as a substring } 01\}$ regular? Prove it.
- 2.) Give the DFA for the set of strings that either begin or end (or both) with 01. Give the formal definition of the DFA in addition to the state diagram.
- 3.) Is the language $\{w \mid w = w^R\}$ (w is a palindrome) regular? Prove it.
- 4.) Give the NFA, DFA and RE for the set of strings over the alphabet $\{0, 1, \dots, 9\}$ such that the final digit has appeared before.
- 5.) Convert the following CFG to CNF:
$$S \rightarrow AB$$
$$A \rightarrow aAA \mid \epsilon$$
$$B \rightarrow bBB \mid \epsilon$$
- 6.) Give a CFG for the language $\{w \mid w \text{ has twice as many } 0\text{'s as } 1\text{'s}\}$.
- 7.) Give the PDA for the language $\{w \mid w \text{ has twice as many } 0\text{'s as } 1\text{'s}\}$.
- 8.) Is the language $\{a^m b^n c^n \mid m, n \geq 0\}$ regular or context free? Prove it.
- 9.) Prove that the language $\{a^i b^j c^k \mid i \neq j \text{ or } j \neq k\}$ is either context free or not context free.
- 10.) Show that the language $\{0^n \# 0^{2n} \# 0^{3n} \mid n \geq 0\}$ is not context free.