Theory of Computation, Fall 2022
Assignment 4 (Due October 17 Monday 10:00 am)

Q1. Give a context-free grammar that generates the following language. Your grammar should use at most 2 non-terminals and should have at most 6 rules.

$$\{w \in \{0,1\}^* : |w| \text{ is odd}\}$$

Q2. Give a context-free grammar that generates the following language. Your grammar should use at most 2 non-terminals and should have at most 6 rules.

$$\{w \in \{0,1\}^* : w \text{ has equal number of 0's and 1's}\}$$

Q3. Give a context-free grammar that generates the following language. Your grammar should use at most 3 non-terminals and should have at most 10 rules.

$$\{w\#x : w, x \in \{0,1\}^* \text{ and } w^R \text{ is a substring of } x\}$$

Q4. Let $G = (V, \Sigma, S, R)$ be some context-free grammar in Chomsky norm form. Prove that for any string $w \in L(G)$, the number of distinct derivations from S to w is finite.