Group Assignment 2, Due: March 7, 17.00.

1. Present two different PDAs for $a^{2n}b^n$. Also, CFG.
2. Construct PDA and CFG: $L_0 = \{x \mid x \in \{0,1\}^* \mid n_0(x) = n_1(x) + 1\}$, n_0 represents the number of 0's in x.
3. Find a CFG equivalent to the regular expression; $(011+1)^*(01)^*$
4. Construct PDA and CFG: the set of odd-length strings over $\{a, b\}$ whose first, middle, and last symbols are all the same.
5. Consider the CFG: $S \to aSbScS \mid aScSbS \mid bSaScS \mid bScSaS \mid cSaSbS \mid cSbSaS \mid \epsilon$. Does this generate set of all strings over a, b, c with equal number of a's,b's and c's. Justify.
6. Does there exists a DFA for the grammar $S \to AabB, A \to aA \mid bA \mid \epsilon, B \to Bab \mid Bb \mid ab \mid b$. If exists, find an equivalent regular grammar.
7. Prove that the CFG with productions $S \to 0S1S \mid 1S0S \mid \epsilon$ generates equal no of 0's and 1's.
8. Find CFG if exists: $\{a^i b^j c^k \mid i \neq j + k\}$, $i, j, k \geq 1$.
9. Find CFG if exists: $\{a^i b^j \mid \frac{i}{2} \leq j \leq \frac{3i}{2}\}$.
10. Find CFG if exists: $\{x \mid x \neq ww, w \in \{a, b\}^*\}$.
11. Find CFG if exists: $\{x \in \{0,1\}^* \mid \text{decimal}(x^R)\text{div}5 = 0\}$
12. Construct PDA and CFG: the set of all strings over $\{0, 1\}$, such that no prefix has more 1's than 0's.