1. Given any CF grammar \( G = (\Sigma, N, S, P) \), construct a grammar \( G' \) such that

\[
L(G') = \{ \overline{w} : w \in L(G) \}
\]

(\text{where for a word } w = \sigma_1 \ldots \sigma_n, \overline{w} \text{ is its reverse } \sigma_n \ldots \sigma_1).)

2. Construct a PDA, \( M \), such that

\[
L(M) = \{ 0^l 1^k : k \leq l \leq 2k \}
\]

3. Prove that \( \{w\overline{w}w : w \in \{0,1\}^* \} \) is not a CFL (\( \overline{w} \) is the reverse of \( w \)).

4. Prove that if \( L_1 \) is a CFL and \( L_2 \) is a regular language, then \( L_1 \cap L_2 \) is a CFL.