# Homework 3

学号 姓名

1. Design context-free grammars for the following languages:

   a) L = $\{a^i b^j | i \neq j \text{ and } i \neq 2j\}$

   b) The set of all strings with twice as many 0's as 1's.

2. Design a PDA to accept each of the following languages. You may accept either by final state or by empty stack, whichever is more convenient.

   a) The set of all strings of 0's and l's such that no prefix has more l's than 0's.

   b) $\{0^n 1^m | n < m < 2n\}$

3. Design a context-free grammar for the language consisting of all strings over $\{a, b\}$ that are **not** of the form $ww$, for some string $w$. Explain how your grammar works. You needn't prove it's correctness formally.