

**Reading Assignment:** Sipser 3.1,3.2, 4.1,4.2

1. Let  $L = \{0^n 1^1 0^n 1^n \mid n \geq 0\}$ . Prove that  $L$  is not context-free.
2. Let  $L$  be the language of all palindromes (strings  $w$  such that  $w = w^R$ ) over  $\{0, 1\}$  containing an equal number of 0s and 1s. Prove that  $L$  is not context-free.
3. Let  $T = \{(i, j, k) \mid i, j, k \in \mathcal{N}\}$ , where  $\mathcal{N}$  is the set of natural numbers  $\{1, 2, 3, \dots\}$ . Prove that  $T$  is countable.
4. Sipser's text, 2nd edition, Exercise number 3.2, parts (b) and (d). (Same for 1st edition.)
5. **Extra Credit:** To be done for the glory, not the points. Sipser's text, 2nd edition Problem 4.22 (1st edition Problem 4.20).