

## Handout 1: Problem Set 3

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**Due by Friday, Dec 18th, 8pm.**

**Problem 1** Express the set

$$\{101001000010^8 10^{16} \dots 10^{2^k} \mid k \geq 1\}$$

as the intersection of two context-free language.

**Problem 2** Write a context-free grammar for each of the sets

1.  $\{a^n b^* c^n \mid n \geq 1\}$
2.  $\{a^n b^{n+m} c^m \mid n, m \geq 1\}$
3.  $\{a^i b^j c^k \mid j \geq i + k\}$

**Problem 3** Give a context-free grammar generating  $L$  complement where

$$L = \{www \mid w \in \{a, b\}^*\}$$