

CSI 409 — Fall 2017: Homework #4

Due date: Oct 20

Answer all questions on your own. Turn in your answers at the **beginning** of class. Write your preferred e-mail address (e.g. zz6000@csc). If you are using more than one sheet of paper, make sure that you *staple* all the sheets together.

Remember that collaboration of any kind is not allowed.

1. Design a context-free grammar for the language

$$L = \{a^k b^m \mid (0 \leq k < m) \vee (k > 2m \geq 0)\}$$

The alphabet is $\{a, b\}$.

Hint: The strings a , b , abb , $aaab$ and $bbbb$ belong to L , whereas ϵ , $aabb$ and $aaabb$ do not.

2. Design a context-free grammar for the language

$$L = \{a^k b^m \mid k + m \text{ is an even number}\}$$

The alphabet is $\{a, b\}$.

Hint: The strings ϵ , aa , bb , $aabb$, $aaab$ and $bbbb$ belong to L , whereas a , b , $abab$ and $aaabb$ do not.