

CSC 440 – Theory of Computation
Homework Assignment #8 – Context-Free Languages
Due Monday, October 28, by 8:00 PM

For this homework assignment, answer the following question. Keep in mind that the purpose of homework assignments is to give you practice doing things you will need to know how to do on exams.

1. Prove that the language $L = a^n b^m c^n d^m$, $n > 0$, $m > 0$ is NOT a context-free language.

2. Consider the following languages:

$$L_1 = a^n b^{2n} c^m, \quad n \geq 0, \quad m \geq 0$$

$$L_2 = a^n b^m c^{2m}, \quad n \geq 0, \quad m \geq 0$$

(a) Show that L_1 and L_2 are context-free languages by giving grammars for each.

(b) Is $L_1 \cap L_2$ a context-free language? Justify your answer (if it is not a context-free language, you do not need to do a full proof with the Pumping Lemma – just a reasonable argument).