

Limits of Computation (CS:4340:0001 or 22C:131:001)
Homework 6

The homework is due in class on Tuesday, Dec 8. If you can't make it to class, drop it in my mailbox in the MacLean Hall mailroom.

1. Let L be the language

$$\{x \in \{0, 1\}^* \mid x \text{ has at least one 0 and at least one 1}\}.$$

Thus, $101 \in L$, $0011 \in L$, $111 \notin L$, and $00 \notin L$. Describe a circuit family that decides L . What is the size of the circuit family, in big-O terms? (5 points)

2. Review (for yourself) the proof of Lemma 6.11, which asserts that $\text{CKT-SAT} \leq_P 3\text{SAT}$. Show how the reduction algorithm works on the following circuit. (5 points) Abbreviate how the gates are translated into CNF, to avoid writing a huge answer.

