

**18.504: FINITE MODEL THEORY**  
**HOMEWORK 6**

Due Thursday April 10, in class.

**Problem 1.** Exercises 7.15.

**Problem 2.**

- (a) Corollary 7.22 states that over strings,  $\text{MSO} = \exists\text{MSO}$ . Explain why this is true, providing more detail than in the textbook.
- (b) Is  $\exists\text{MSO} = \forall\text{MSO}$  over strings? Justify your answer.

**Problem 3.** Let  $L_1, L_2$  be regular languages over the same alphabet  $\Sigma$ . Define  $L'$  to be the language consisting of all words of the form  $a_1b_1 \cdots a_nb_n$ , for  $n \in \mathbb{N}$ , with  $a_i \in L_1, b_i \in L_2, i \leq n$ . [You may assume that the empty word is neither in  $L_1$  nor  $L_2$ .] Give two proofs that  $L'$  is regular, one using finite automata, and the other using Buchi's theorem.