# CSCI 338: Quiz 4 (due: Friday, March 26, 8:00pm)

## Your Name:

This is an open-book quiz (not an attendance counting), so you should try your best. After you finish, upload a pdf file on D2L under Quiz-4. A solution will be posted on D2L after the deadline.

## Problem 1

On March 19, we covered an undecidability proof for $REGULAR_{TM}$, where we construct a TM $M_2$ with the property that either $L(M_2) = \Sigma^*$ or $L(M_2) = \{0^n1^n | n \geq 0\}$ — depending on whether $M$ accepts $w$ or not. (This is basically Theorem 5.2 in the textbook.) On the other hand, notice that in this two cases $L(M_2)$ have overlaps (as $\{0^n1^n\} \subset \Sigma^*$).

In this quiz, you are asked to write a new undecidability proof for $REGULAR_{TM}$ such that in the two cases (i.e., when $M$ accepts $w$, and when $M$ doesn't accept $w$), the corresponding two languages $L(M_2)$ do not overlap at all.