

University of Nevada, Las Vegas Computer Science 456/656 Spring 2025

Assignment 5: Due Saturday March 8, 2025, 11:59 PM

Name:\_\_\_\_\_

You are permitted to work in groups, get help from others, read books, and use the internet. You will receive a message from the graduate assistant, Louis, telling you how to turn in the assignment.

If  $w$  is any string, we write  $w^{-1}$  for the *inverse* of  $w$ . For example, if  $w = abcca$  then  $w^{-1} = accba$ . A *palindrome* is a string which is equal to its own inverse, such as “level.” We write  $\#_0(w)$  for the number of zeros in  $w$ , and  $\#_1(w)$  for the number of ones.

1. There will be True/False questions on the second examination. Study the handout tf2.pdf.
2. Give a correct statement of the pumping lemma for regular languages. Be sure to keep track of quantifiers and conditionals. An answer which contains all the right words but which is not logically correct might get no credit.

3. Prove that the halting problem is undecidable.

4. Give a  $\mathcal{P}$ -TIME reduction of 3-SAT to IND, the independent set problem. Pictures might help.

5. Give a  $\mathcal{P}$ -TIME reduction of the subset sum problem to Partition.