General Announcements

- Homework grading is ongoing. Currently, Homework 7 is being graded. Homeworks 5 and 6 need to still be graded.
- Homework solutions and recitation problems will be posted as they become available over the next few days.
- Quiz 2 has been handed back. Pick up your Quiz 2 during my office hours. Solutions are posted on the course website. All grades have been adjusted (i.e., +6 points) in Submitty Rainbow Grades.
- For any Quiz 2 questions or regrades, please see any TA or me during office hours
- Homework 9 is our last homework assignment.
- At recitation on 5/2 (last day of classes), there will be review for Quiz 3, which is on 5/2 at 6:00-7:50PM in DCC 308 (as per usual). Quiz 3 will be entirely multiple choice and focus on our coverage of Chapters 22-29 (or however far we get with that material). You will pick up your Quiz 3 after you hand in your final exam....
- Our final exam is Tuesday 5/8 from 11:30AM to 2:30PM in DCC 308. Our final exam will be comprehensive and similar in style to the midterm exam, i.e., a mix of multiple choice and freeform-answer questions. Final exams will not be handed back or available for review.

Constructing a DFA

As an example, construct a DFA for language \( \mathcal{L} = \{1^{2n}01^{2k+1}|n,k \geq 0\} \)

1. First identify what strings are accepted by the language
2. Be sure that all possible input symbols (e.g., binary digits 0 and 1) have transitions from each state \( q_0, q_1, q_2, \) etc.
3. Identify at least one final state
4. If \( \varepsilon \) is accepted, then initial state \( q_0 \) is also a final state

Pop Quiz 26.1

How does the Turing Machine pseudocode shown in today’s slides to solve \( w \# w \) behave with inputs: 0110; 01\#10; 101\#10; 10\#101?
Pop Quiz 26.4

How does the Turing Machine shown in today’s slides to solve $w\#w$ behave with inputs: 01#01; 01#10; 0#01; 01#0?

Exercise 26.6

For each problem below:

(i) Give a pseudocode description of a Turing Machine that solves the problem

(ii) Give a machine-code description for each module in your pseudocode

(iii) Combine your modules to form a Turing Machine that solves the problem

(a) $L = \ast 01\ast = \{\text{strings containing } 01\}$. (A regular language.)

(b) $L = \{ww|w \in \{0, 1\}\ast\}$. (Repetition without punctuation in the middle.)

Exercise 26.8

Give pseudocode for a transducer that solves the given problems below.

(a) (Copying) The input is a string $w$ and the final state of the tape is $w\#w$

(b) (Copying, no punctuation/delimiter) The input is a string $w$ and the final state of the tape is $ww$

(c) (Squaring) The input is $0^n$ and the final state of the tape is $0^n\#1^n^2$

(d) (Reversal) The input is a string $w$ and the final state of the tape is $w^R$