

Part 1: Submit online via email to TA

1. (a) Give the formal-level specification of a DTM for deciding the language $\{a^m b c^n \mid m \neq n\}$. Save this in file hw4prob1a.
(b) Run your first design of TM on JFLAP with at least 3 strings in the language and at least 3 strings not in the language. List the test strings and the verdicts of JFLAP with your solutions.

Part 2: Bring to class

1. Design machine schemas of deterministic TMs for:
 - (i) deciding the language $\{I^n \mid n \text{ is divisible by } 5\}$. The TM should start at the 1st blank cell to the right of the input. Assume that there is an empty cell at the left-end and then the input.
 - (ii) given a number x in unary notation, outputs the number 2^x in unary notation. The output should be separated from the input by a blank cell and the TM should start at the 1st blank cell to the right of x . Assume that there is an empty cell at the left-end and then the input x .
2. A clique in an undirected graph $G = (V, E)$ is a subset of the vertices, say V' , such that every pair of vertices in V' has an edge between them. The size of a clique V' is $|V'|$, the number of vertices in V' . Give the algorithmic description of a nondeterministic Turing machine for accepting the following language: $\{\langle G, k \rangle \mid G \text{ is an undirected graph containing a clique of size at least } k\}$. Indicate clearly in your answer the steps in which guessing is involved and exactly what is guessed in each such step.
3. Problem 3.16 (c).
4. On a separate sheet of paper (do not attach this sheet to the rest of the homework):
 - (a) list your comments on JFLAP and mention the version you used. Consider: ease of use, graphics, usefulness and overall experience.
 - (b) Would you be in favor of a 1-3 hours/week **mandatory** (i.e attendance is required in at least 80% of these) recitation section for this course in which the TA goes over the harder course material, student questions, and solves some exercises? If you object only to the mandatory part, let me know that and tell me whether you would be in favor of this idea with optional attendance. If you would prefer that the recitations be given by the instructor, state that as well. Give reasons for your positions in at most 1-2 paragraphs.