

Department of Computer Science, University of Houston
COSC 3340 - Exercise Set 4
Fall 04, Due November 16 at 4pm.

1. 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. (c) list your comments on the random input feature of UH-JFLAP on ease of use and usefulness. (d) What additional features in UH-JFLAP would make the software more helpful to you for your homeworks and in improving your understanding of the course concepts.
2. (a) Give the formal-level specification of a TM for deciding the language $\{w \in \{a, b\}^* \mid |w| \text{ is odd and the middle symbol of } w \text{ is } a\}$.
(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. Once JFLAP gives correct verdicts for the six strings you chose, debug your design further on UH-JFLAP. List the test strings and the verdicts of JFLAP and UH-JFLAP with your solutions.
(c) Was UH-JFLAP able to catch any errors in your first design?
(d) How did the first design change if the answer to part (c) is yes.
Do **not** answer parts (a), (c) and (d) on the computer printouts for part (b).
3. Design a machine schema of a deterministic TM for the language $\{a^{n^2} \mid n \geq 0\}$.
4. A dominating set in an undirected graph $G = (V, E)$ is a subset of the vertices, say V' , such that every vertex in $V - V'$ has an edge to a vertex in V' . Give the algorithmic description of a nondeterministic Turing machine for accepting the following language: $\{\langle G, k \rangle \mid G \text{ is an undirected graph containing a dominating set of size at most } k\}$. Indicate clearly in your answer the steps in which guessing is involved and exactly what is guessed in each such step.
5. Problem 3.14 (c).