

CS 332 Test 2, Fall 2018

Turn in this sheet with your work. Write your name on every sheet of paper. Write on only one side of your paper. Do not staple, dog-ear, fold, or otherwise attach papers together. Turn in to the instructor before 3 pm, Monday, Dec 12.

1. (30 pts) Consider a list of employees that identifies the skills those employees possess. Each employee may have (and likely has!) more than one skill. Each project that the company contracts for requires a set of skills and a team of employees having those skills. Each team member must possess all of the skills the project requires. When management wants to put together a team to work on a new project, they want to choose from a list of employees that only has the skills required for the project. In other words, management wants to have the list of all employees filtered so that they are working with only the list of employees having the skills for the job. Briefly describe how this can be accomplished in each of the procedural, object-oriented, and functional paradigms.
2. For each problem identify the weakest machine that can address it (FSM, PDA, TM). Justify your answer.
 - (a) (5 pts) Determining if a single *if-then-else* block has properly paired brackets. That is, a single opening and a single closing bracket for each branch of the *if* statement.
 - (b) (5 pts) Determining if an arbitrarily deep nesting of *if-then-else* blocks has properly paired brackets. That is, every opening bracket has a single closing bracket for all branches.
 - (c) (5 pts) Determining which branch is taken during execution.
3. (10 pts) Make a context sensitive grammar and explain why it is context sensitive. You can use any language and alphabet that you wish.
4. Identify each program analysis as a syntactic or semantic problem. Provide a brief justification or example. Also state, without justifying, if the analysis can always be done on the static program or may have to wait until run time.
 - (a) (5 pts) Determining if a function definition returns a particular type of result.
 - (b) (5 pts) Determining if a single program statement is legal for the language it is written in.
 - (c) (5 pts) Determining which value is assigned to a variable if the variable is assigned values in both branches of an *if* statement.
5. (10 pts) Is determining program correctness Turing Computable? Is there evidence in the software engineering community either way? Justify your answer.