

CS305: Homework 2

Assigned: Monday, March 04, 2024

Due date: Wednesday, March 20, 2024

- Do all of the following problems. **Show your work.** Homework submissions must be **typed** and submitted to the Spring **as a pdf**.
- You may work with others on the homework, but you **MUST** acknowledge the people you worked with at the top of your homework submission. Do **not** look at the web for solutions to homework problems. Looking for solutions does **not** help your problem solving powers.

Problems

Note that the book separates things into exercises and problems with exercises appearing at the end of a section and problems (which tend to be longer) appearing at the end of the chapter.

To get full credit, for any of your dynamic programming solutions, follow this format (the way we did all the dynamic programming problems in class.)

- State what information is given and the objective
- Determine the parameters of the problem (those whose value change as you consider subproblems)
- Make a table of choices to be made at each step, what subproblems they generate and what the immediate reward of each choice is.
- Define a value function, F , in words accurately, including reference to the parameters and the resulting value.
- Define F recursively (usually with max or min and ifs), based on the choices/subproblems/immediate reward table.
- Define base case(s) for F .
- State how to determine the answer from the F table once all cells are computed.
- Provide pseudocode for the dynamic programming algorithm (which should compute and store values into the F table) and at last return the solution.
- Analyze the running time of the algorithm.

1. Finish the attached problem (maximizing scheduled time for a room, by scheduling compatible (no overlap of time) activities with start/finish times and a starting time and closing time for the room.)
2. Rewrite the dynamic programming solution to the Rod-cutting problem in the text in section 14.1, focus on the "bottom up method". Write your answer by following the format listed above (addressing all the bulleted points in order).
3. Problem 14-8 Image compression by seam carving
4. Problem 14-12 Signing free-agent baseball players
5. Problem 15-2 Scheduling to minimize average completion time