

Design and Analysis of Algorithms Minor

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Homework 3

by [Abhiram Ranade Ranade](#) - Sunday, 13 September 2020, 6:41 PM

[Homework 3](#). Deadline 11:55pm Sept 21. (Extended deadline: 1 hour after that).

All problems except for one are based on dynamic programming. Your solution to dynamic programming problems should contain the following.

1. The space from which the solution is to be found, or the space of objects whose average/weighted average is to be calculated.
2. The structure of the space, i.e. how do you partition the space so that you can recurse over the subspaces to solve the problem. Please be precise in describing this and use notation as needed, and as seen in the lectures.
3. Recurrence for the (cost/probability/... of the).
No credit if you don't clearly explain what the recurrent term means.
4. Description of the table, how many rows, columns, ... where the final answer will be found.
5. Analysis of the time taken by the algorithm.
6. How do you extract the first element of the solution, and a 2 line description of how to get the rest.

Solve the following problems from DPV

6.2

6.5 In this use the following solution space: sequence of patterns appearing in each column. The problem statement gives details of this.

6.10 $O(n^2)$ solution: using DP.

6.10 $O(n \log^2 n)$ solution using FFT. Express the calculation as calculation of coefficients of an appropriate polynomial.

6.14 Expected time: polynomial in X, Y, n . Carefully note the allowed cuts: the cut must be parallel to the length or width and go all the



way to the end.

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