**Quiz 3**

1. The input is a sequence of n words of lengths l1, l2 . . . ln measured in characters. We want to print it nicely on a number of lines that can hold a maximum of M characters each. The criterion for ”niceness” is as follows. No word can be split across lines with a blank separating words and each line should be as full as possible. The penalty for a trailing space of s is s3. If si is the space left in line i, we want to minimize si3. Show how you would develop a Dynamic Programming approach for solving this problem. **[4]**
2. Given to you is a directed graph G with n nodes, you need to find out if a vertex j is reachable from another vertex i for all vertex pairs (i, j) in G (or in other words, there is a path from I to j). Write the pseudocode for the algorithm for the creating the reachability matrix using Dynamic programming. **[4]**
3. Suppose that we are given a directed acyclic graph G(V,E) with real valued edge weights and two distinguished vertices s and t . Describe a dynamic programming approach for finding a longest weighted simple path from s to t . What does the subproblem graph look like? What is the efficiency of your algorithm? **[4]**
4. Given the following probabilities, construct the optimal binary search tree using a Dynamic Programming approach. **[4]**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 |
| P |  | 0.25 | 0.15 | 0.10 | 0.10 |
| q | 0.05 | 0.10 | 0.05 | 0.10 | 0.10 |