CS 122A HW 6, Due Wed. November 17

1. Read the discussion, page 295-297, of how to improve the memory requirements of the Bellman-Ford algorithm, and how to actually find the shortest paths using limited memory. The key to the latter task is the array *first*. Then show the complete details of using this limited memory method to compute the shortest path distance from each node in the graph to node t in Figure 6.23 on page 294. Also, show the details of accumulating the array *first* for the graph, and then show the details of using array *first* to find the actual shortest path from node a to node t.

2. Read the definition of an Independent Set on page 16 of the text. Then read the definition of a Maximum Weighted Independent Set in a Tree on page 560, and read until the end of page 562 to see an efficient DP solution to the problem of finding a maximum weighted independent set in a tree.

The book is not very explicit about how to do the traceback in this DP algorithm, but there are notes on the class website on how to do the traceback. Read them. Then show the complete details of solving the maximum weighted independent set problem using that DP and traceback, on the example shown in Figure 1.

3. Read the notes on the Unique Decypherability problem. These prove the main theorem in one direction, i.e., that if C is not UD then there is a path with at least one edge in G from a node representing a codeword to a node (possibly the same node) representing a codeword. Prove the converse, i.e., that if there is such a path in G then C is not UD. The idea is to use the path to define a message M and two distinct parses of M.

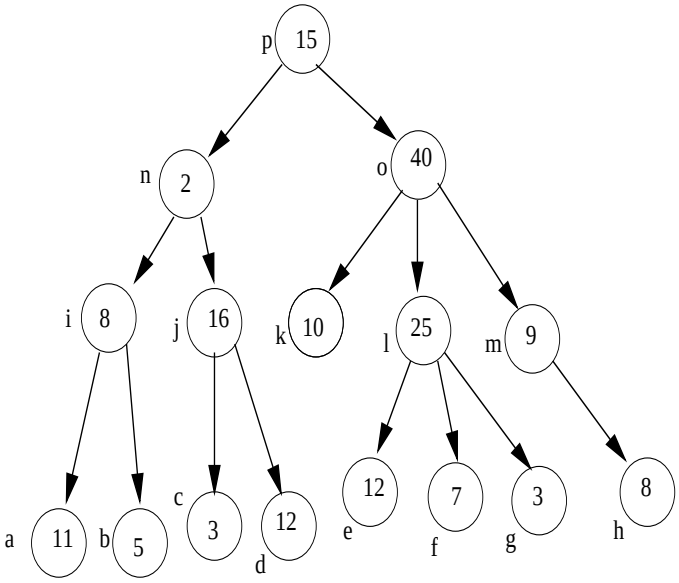

Figure 1: The weight of each node is written inside the node. The name of the node is written outside the node.