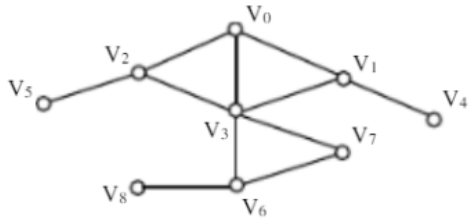
Data Structure and Algorithm Design

Correcting Homework mutually

1. (20 points) Please draw the adjacency matrix and adjacency list of the following directed graph, and then from the starting point V_0, traverse the graph using depth-first search and breadth-first search according to your adjacency list and give the two corresponding traversal sequences.



2. (15 points) Given Hash function H(k)=3K mod 11 and the key sequence {32，13，49，24，38，21，4，12}. The size of hash table is 11.

a. Construct the hash table with linear probing method. **(10 points)**

b. Calculate the average search length for successful and unsuccessful search under the equal probability. **(5 points)**

3. (25 points) Show the contents of the array of integers 10 16 11 4 15 3 9 6 1 17 8 each pass while sorting the array into ascending order using Shell sort (The separation between indices are 5 3 1) (9 points). Show the steps when merge sort is to be used(8 points). and suppose we use the middle value in the array as pivot, please show the result of first pass of quick Sort(8 points).

4. (15 points) A boy draws a binary tree using words as elements. In order to search words in a quick way, the boy draws the small words in left subtree and the large words in right subtree. The order of words is defined as the alphabetical order. i.e. apple < banana, pear < watermelon. You help him draw a binary tree using the following sequence {bag, queue, list, string, stack, tree, graph, sorting}**(8 points)**, write the name of kind of binary tree that the boy drew**(2 points),** and calculate the average search length to search a word in the tree(**5 points**).

5. (10 points) Suppose we know that the preorder traversal of a binary tree is A B C D E and the postorder traversal of the tree is C B E D A, What is the inorder traversal of the tree?

6. (15 points) Given a set of characters { a, b, c, d, e, f } with their occurrence frequencies being {5, 7, 2, 3, 6, 9}, respectively. Please construct a Huffman tree (to be sure the weight of left child <= the one of right child)**(10 points)**, and give the Huffman code of each character**(5 points)**.