Please use Greedy approach to solve each of these problems (unless indicated otherwise). Also, you are expected to derive the best possible algorithm to solve the problem (unless indicated otherwise). Poor performance solutions (even if they are correct) may not get any credit. Divide your solution into four parts when you are asked to design an algorithm:

1. Description of the basic approach
2. Pseudo Code (or code in any high level language such as Java, C, C++)
3. Proof of Correctness
4. Complexity Analysis

Please write legibly. You are required to turn in a hard copy. Emailed homework will be ignored.

There are 9 problems in the homework, where first five problems are from the Computer algorithms textbook.

1. (10 points) Chapter 4.10, problem 1
2. (10 points) Chapter 4.10, problem 3
3. (10 points) Chapter 4.10, problem 4
4. (10 points) Chapter 4.4, problem 1
5. (10 points) Chapter 4.5, problem 5
6. (15 points) Professor Manna drives a motorcycle from Gainesville to Los Angeles along Interstate I-10. His bike’s gas tank, when full, holds enough gas to travel n miles, and his map gives distances between gas stations on his route. The professor wishes to make as few gas stops as possible along the way. Give an efficient method by which Professor Manna can determine at which gas stations he should stop, and prove that your strategy yields an optimal solution.
7. (10 points) Give optimal Huffman codes for the following set of frequencies, based on the first 8 Fibonacci numbers: a:1, b:1, c:2, d:3, e:5, f:8, g:13, h:21. Can you generalize your answer to find the optimal code when frequencies are the first n Fibonacci numbers?
8. (10 points) Suppose we want to solve the single-source longest path problem. Can we modify Dijkstra’s algorithm to solve this problem by changing minimum to maximum? If so, then prove your algorithm correct. If not, then provide counterexample.
9. (15 points) Show that Prim’s algorithm and Kruskal’s algorithm always construct the same min-cost spanning tree on a connected undirected graph in which edge costs are distinct.