Q 1: Solve the following recurrence relation

(a) \[ T(n) = 2T(n/2) + 7n, \] if \( n > 1 \). Assume \( T(n) = 4 \) if \( n = 1 \).
(b) \[ T(n) = 2T(n-1) + 5n, \] if \( n > 1 \). Assume \( T(n) = 2 \) if \( n = 1 \).

Q 2: Explain quick sort algorithm with example. How the worst case time complexity can be improved? Justify your answer.

Q 3: Prove that the time complexity of strasen's matrix multiplication is \( O(n^{\log_7 2}) \)

Q 4: Calculate Longest Common Subsequence for the sequences \( X = 'ababa' \) and \( Y = 'abbaa' \) also explain the algorithm.

Q 5: What is Matrix Chain Multiplication problem? Create a C program to that optimally parenthesise a given Chain of Matrices.

Q 6: Explain 0/1 Knapsack problem. Find optimal solution if weight set is \(<3, 4, 2, 5>\) and profit sets is \(<12, 8, 6, 15>\). The maximum knapsack capacity is 9.

Solution: As discussed, explained and dictated in the classes.