



Design and Analysis of Algorithms
Tutorial 4

Decrease and Conquer Approach

It is important that we learn the theory behind the decrease and conquer approach and its algorithms.

1. Explain the theory behind the decrease and conquer approach
 - (a) What is meant by the decrease and conquer approach?
 - (b) Is decrease and conquer more efficient than brute force?
 - (c) What are the three types of decrease and conquer algorithms?
2. Consider the following decrease by a constant algorithms
 - (a) Use the minimal change algorithm to generate permutations for the set {6,7,8}.
 - (b) Use the binary reflected grey code algorithm to generate combinations for the set {1,2,3}.
3. Analyse the following recurrence relation for the worst case binary search algorithm and answer the following questions.

$$C_w(n) = C_w(\lfloor \frac{n}{2} \rfloor) + 1, \text{ for } n > 1 \quad (1)$$

$$C_w(1) = 1 \quad (2)$$

- (a) Calculate the time complexity using the backward substitution method.
- (b) Calculate the time complexity using master's theorem.
Note that master's theorem only works with divide and conquer algorithms and decrease and conquer algorithms that reduce by a factor.