

**Divide and Conquer Method**  
**(Binary Search, Merge Sort, Quick Sort, Randomized Quick Sort)**  
**PROGRAM EXERCISE**

## CONTENTS

Prog. No.	Program Title
1	Write a program to search an element x in an array of n integers using binary search algorithm that uses divide and conquer technique. Find out the best case, worst case, and average case time complexities for different values of n and plot a graph of the time taken versus n. The n integers can be generated randomly, and x can be chosen randomly, or any element of the array or middle or last element of the array depending on type of time complexity analysis.
2	Write a program to sort a list of n elements using the merge sort method and determine the time required to sort the elements. Repeat the experiment for different values of n and different nature of data (random data, sorted data, reversely sorted data) in the list. n is the user input and n integers can be generated randomly. Finally plot a graph of the time taken versus n.
3	Write a program to use divide and conquer method to determine the time required to find the maximum and minimum element in a list of n elements. The data for the list can be generated randomly. Compare this time with the time taken by straight forward algorithm or brute force algorithm for finding the maximum and minimum element for the same list of n elements. Show the comparison by plotting a required graph for this problem.
4	Write a program that uses a divide-and-conquer algorithm/user defined function for the exponentiation problem of computing $a^n$ where $a > 0$ and n is a positive integer. How does this algorithm compare with the brute-force algorithm in terms of number of multiplications made by both algorithms