

### Iterative and Recursive methods

1. Write a C/C++ program to print Fibonacci series upto nth term using iteration also compute time complexity.
2. Write a C/C++ program to print Fibonacci series upto nth term using recursion also compute the time complexity in terms of input size.

### Searching

3. Write a C/C++ program using linear search to search an element in an array also compute time complexity for an input of size N.
4. Recursive Write a C/C++ program to perform binary search on an array of size N and compute time complexity for size N.

### Sorting

5. Write a C/C++ program to perform **bubble sort** on an integer array to sort it in ascending order and compute the time complexity for an input of size N.
6. Write a C/C++ program to perform **insertion sort** on an integer array to sort it in ascending order and compute the time complexity for an input of size N.
7. Write a C/C++ program to perform **selection sort** on an integer array to sort it in ascending order and compute the time complexity for an input of size N.
8. Write a C/C++ program to perform **merge sort** on an integer array to sort it in ascending order and compute the time complexity for an input of size N.
9. Write a C/C++ program to perform **quick sort** on an integer array to sort it in ascending order and compute the time complexity for an input of size N.
10. Write a C/C++ program to perform **count sort** on an integer array to sort it in ascending order and compute the time complexity for an input of size N.
11. Write a C/C++ program to perform **radix sort** on an integer array to sort it in ascending order and compute the time complexity for an input of size N.

### Heap

12. Write a C/C++ program to **insert an element into heap**, also compute time complexity for an input of size N.
13. Write a C/C++ program to **delete the N element** from a heap, also compute time complexity for those N elements.
14. Write a C/C++ program to **build a heap using heapify** and use it to perform heap sort, also compute the time complexity for an input of size N.
15. Write a C/C++ program to perform **heap sort** on an integer array to sort it in ascending order and compute the time complexity for an input of size N.

### Amortize analysis

16. Write a C/C++ program to implement dynamic array. First take maximum length of array from user input. Then start by creating array of size 1, and start taking input. Every time the array is full, double its capacity. Use amortize analysis (aggregate) to calculate time complexity of the program.
17. Write C/C++ program to implement stack with the use of array. Make a new function Multi Pop which pops k times. Take k as user input. Uses amortize analysis (accounting) to calculate time complexity of the program.

### String Matching

18. Write C/C++ program to implement KMP string matching method to find the pattern string in a text string both given by the user. Compute the complexity of the method for a text string of length N and pattern string of length M, where  $N > M$ .