

# Problems on Array

1. Create a Class Search within that implement two Generic method LinearSearch(), BinarySearch(). Test your program for different data.
2. Create a Class BasicSort within that implement three Generic methods that can implement the BuubleSort(), SelectionSort(), InsertionSort() that can sort of any type of data.
3. Write a Generic method that computes the Second minimum and Second maximum elements of an array of type T and returns a pair containing the minimum and maximum value.
4. Write class SparseMatrix to give a compressed storage representation of a sparse matrix and also find the transpose of the sparse matrix (from the compressed representation).
5. Write a Class CheckTriangular within that implement methods to check whether a matrix is  
i) Lower triangular ii) Upper triangular iii) Diagonal iv) Identity v) Tridiagonal.
6. Write a program to find whether a matrix is orthogonal or not. Also find the 1-norm of the matrix.
7. Create a program with multi-dimensional List to store customer details (customerId, customerName, customerCity).

This program to search the customer based on the customerName from a given array.

**Note:** use *Binary search and Insertion sort algorithm*.

- Create a constructor to initialize size of customer details for five customers.
  - Create customer method which takes the array of customer elements (sorted as a customerName).
  - Create a method to getCustomer(customerId) method which will return the customer details as a List.
  - Create a method to sortCustomer() method which will return the array in a sorted order based on customer city.
8. Write a class Polynomial to perform the following
    - a. Design a constructor to represent a polynomial (of single variable  $x$ ).
    - b. Create a method to addition of polynomials.
    - c. Create a method to subtraction of polynomials.
    - d. Create a method to multiply of polynomials.
    - e. Create a method to find derivative of the polynomial.

**Note:**

- Programs must be written using Java Programming Language.
- Do proper commenting so that it becomes easy for us to read your code.