```
lower_bound:

        int l = -1;      /// a[mid] < x
        int r = n;       /// a[mid] >= x

        while(r > l+1)      /// <----- remember that line always( r > l+1 )
        {
            int mid = l+(r-l)/2;     /// No overflow

            if(arr[mid] < x)
            {
                l = mid ;
            }
            else
            r = mid ;
        }

        cout << r+1<<"\n";        /// One base index


upper_bound:


        int l = -1;    ///a[mid] <= x
        int r = n;     ///a[mid] > x

        while(r > l+1)
        {
            int mid = l+(r-l)/2;

            if(arr[mid] <= x)
            {
                l = mid ;
            }
            else
            r = mid ;
        }

        cout << l+1<<"\n";    ///  Zero base index
```