3 Sum (Imp)

n = 6

arr =

0	1	2	3	4	5
-2	0	2	4	-2	-8

$$arr[i] + arr[j] + arr[k] == 0$$

$$arr[i] + arr[j] = -1 * arr[k]$$

target = -1*arr[k]

Note :- we are going to run solution of prev. question K no. of times.

n = 6

0	1	2	3	4	5
-2	0	2	4	-2	-8

arr =

Step1

arr =

-8	-2	-2	0	2	4

K i j

target = ~~8~~ ~~2~~ ~~2~~ 0

o/p

-2, -2, 4

-2, 0, 2

-2, 0, 2

Arrays.sort(arr)

pseudo code

```
for(int k=0; k<n; k++){
    1) declare i = k+1, j = n-1;
    2) loop i < j
        2.1) sum < target
                i++
        2.2) sum > target
                j--
        2.3) sum == target
                print arr[k], arr[i], arr[j]
                i++
                j--
}
```

code

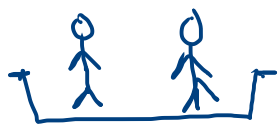
```java
public static void targetTriplet(int[] arr, int n) {
    Arrays.sort(arr);
    for (int k = 0; k < n; k++) {
        int i = k + 1;
        int j = n - 1;
        int target = -1 * arr[k];
        while ( i < j ) {
            int sum = arr[i] + arr[j];
            if ( sum < target ) {
                i++;
            } else if ( sum > target ) {
                j--;
            } else if (sum == target) {
                System.out.println( arr[k] + " " + arr[i] + " " + arr[j] );
                i++;
                j--;
                while ( i < j && arr[i] == arr[i - 1] ) {
                    i++;
                }
                while ( i < j && arr[j] == arr[j + 1] ) {
                    j--;
                }
            }
        }
        // handled dulicay
        while ( k + 1 < n && arr[k] == arr[k + 1] ) {
            k++;
        }
    }
}
```

$T.C = O(n \log(n) + n^2)$

$T.C \cong O(n^2)$

Count boat

- people of weight arr[i]
- each boat can carry 'limit' weight
- each boat can carry atmost 2 people



sum = arr[i] + arr[j]
within limit

arr[i] + arr[j] <= limit

ans = no. of boats reqd.

arr = [3 , 2 , 2 , 1]

sort

arr = [1 , 2 , 2 , 3]

limit = 3

arr[i] + arr[j] <= limit

boats = 3

Code

```java
public static void main(String[] args) {
    Scanner scn = new Scanner(System.in);
    int n = scn.nextInt();
    int[] arr = new int[n];
    for (int i = 0; i < n; i++) {
        arr[i] = scn.nextInt();
    }
    int limit = scn.nextInt();
    System.out.println(boatCount(arr, n, limit));
}
public static int boatCount(int[] arr, int n, int limit) {
    Arrays.sort(arr);
    int i = 0;
    int j = n - 1;
    int count = 0;
    while (i <= j) {
        int sum = arr[i] + arr[j];
        if ( sum <= limit ) {
            i++;
            j--;
        } else {
            j--;
        }
        count++;
    }
    return count;
}
```

$T.C = (n\log(n) + n)$