Max Max Problem

Find out **maximum1** and **maximum2** elements of an array using minimum number of comparisons.

maximum1 - first largest number
maximum2 - second largest number

maximum1 > maximum2

Write a Java function to find out maximum 1 and maximum2 in an array. You program should make minimum number of comparisons.

```
int arr[] =
{2,5,50,4,22,44,9,29,49,21,1,36,18,38,58,26,24,42,15,35,25,6,26,46,51,59,11,37,23,
43,12,32,52,41,55,8,20,40,60,17,3,57,14,34,54,19,45,7,31,27,47,28,33,53,39,13,48,1
6,30,10};
```

max1 = 60

max2 = 59

Java method
public static int twoMaxGreatThanMax1(**int** a[]) -
return a number of comparisons.

Java method
public static int twoMaxLessThanMax2(**int** a[]) -
return a number of comparisons.

{ a[0], a[1], a[2], a[3], a[4], a[5], a[6], ... , a[n] }

1. Solution # 1 complexity O(2n)

Pseudo code

```
int comparisons = 0                    //  Initialization
if (a[0] < a[1])
    max1 = a[1]
    max2 = a[0]
else
    max1 = a[0]
    max2 = a[1]

// null & zero or one length check
comparisons = comparisons +1
if (a == null or  length of a < 2)
        return comparisons
//  length == 2 check
comparisons = comparisons +1
if (length of a == 2)
        return comparisons
```

```
// loop for all elements of the array
loop ( int i = 2 and i<length of a )
    // the first comparison
    comparisons  = comparisons + 1
    if(a[i] > max1)
        max2=max1
        max1=a[i]
    else
        comparisons  = comparisons + 1
        if(a[i] > max2)
            max2=a[i]
```

2. Solution # 2 complexity O(n)

Pseudo code

```
int comparisons = 0                    //  Initialization
if (a[0] < a[1])
    max1 = a[1]
    max2 = a[0]
else
    max1 = a[0]
    max2 = a[1]

// null & zero or one length check
comparisons = comparisons +1
if (a == null or  length of a < 2)
        return comparisons
//  length == 2 check
comparisons = comparisons +1
if (length of a == 2)
        return comparisons
```

```
// loop for all elements of the array
loop ( int i = 2 and i<length of a )
    // the first comparison
    comparisons  = comparisons + 1
    if(a[i] > max2)
        comparisons  = comparisons + 1
        if (a[i] < max1)
            max2 = a[i]
        else
            max2 = max1
            max1 = a[i]
```