**Bubble Sort**

Consider this implementation of the bubble sort:

**// make N-1 passes through the array**

**for (int i=0; i < arr.length-1; i++) {**

**// compare N-1 pairs of elements.**

**for (int j = 0; j < (arr.length-1); j++) {**

**if ( (arr[j] > arr[j+1] ) {**

**temp = arr[j];**

**arr[j] = arr[j+1];**

**arr[j+1] = temp;**

**} // end if**

**} // end inner for**

**} // end outer for**

Given the following array, what is the contents of the array after 3 passes through the bubble sort?

**int[] arr = { 39, 4, 35, 42, 10, 31, 56, 17, 88, 3, 92, 124, 10, -1, 44, 6};**

**Linear Search**

Consider this implementation of the linear search:

**public static int search(int[] arr, int value) {**

**int location=0;**

**boolean found = false; // flag to indicate if the value is found**

**int result=-1;**

**while (!found && location < arr.length) {**

**if (arr[location] == value) found = true;**

**else**

**location++;**

**}**

**if ( found) result = location;**

**return result;**

**} // end search**

Trace the execution of this method assuming, assuming array arr contains the following values:

**{ 39, 4, 35, 42, 10, 31, 56, 17, 88, 3, 92, 124, 10, -1, 44, 6}**

Trace the execution of this method showing the value returned by the method using the following search keys:

**a) 88**

**b) 25**

**c) 6**

**Binary Search**

Consider the following implementation of the binary search:

**public static int bsearch(int[] arr, int searchVal) {**

**int result=-1, mid;**

**boolean found=false;**

**int low=0, high = arr.length-1;**

**while (!found && low <= high) {**

**mid = (low + high) / 2;**

**if (arr[mid] == searchVal) {**

**result = mid;**

**found = true;**

**}**

**else if ( searchVal < arr[mid] )**

**high = mid-1;**

**else low = mid + 1;**

**} // end while**

**return result;**

**}// end bsearch**

Trace the execution of this method assuming arr contains the following values:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | 5 | 7 | 9 | 10 | 12 | 17 | 20 | 24 | 29 | 31 | 37 | 44 | 50 | 62 | 71 | 72 | 80 | 93 | 100 |
| **0** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **N-1** |
| **0** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | **19** |

Using the following search values, trace the values of low, high and mid:

a) 50

b) 9

c) 85

d) 1