# Unit 2 Discussion: Array and ArrayList

1. What was the hardest part of Unit 1 assignments? Please explain. (Note: the purpose of this discussion question is for you to reflect on your assignments last week and share some tips <what failed, what worked, …> with the class)

2. What did you find most confusing or difficult about what you read this week? You may also ask for help on a PA/CA or use of zyBook. (Note: be specific. For example, instead of “xx is hard”, identify the topic and illustrate with an example.)

3. Analyze the following code:

public class Test {

public static void main(String[] args) {

int[] x = new int[5];

int i;

for (i = 0; i < x.length; i++)

x[i] = i;

System.out.println(x[i]);

}

}

A. The program displays 0 1 2 3 4.

B. The program displays 4.

C. The program has a runtime error because the last statement in the main method causes ArrayIndexOutOfBoundsException.

D. The program has a compile error because i is not defined in the last statement in the main method.

4. What is copiedNums' length after the code segment?

// main

int[] originalNums = {1, 2, 3, 4};  
int[] copiedNums = {0, 0, 0};  
copiedNums = copy(originalNums, 2);

// What is copiedNums' length now?

public static int[] copy(int[] nums, int changeAmt) {  
 int[] modifiedNums = new int[nums.length \* changeAmt];  
 int index;  
 for(index = 0; index < nums.length; ++index){  
 modifiedNums[index] = nums[index];  
 }  
  
 return modifiedNums;  
}

A. 3

B. 4

C. 6

D. 8

5. Analyze the following code:

public class Test {

public static void main(String[] args) {

int[] x = {1, 2, 3, 4};

int[] y = x;

x = new int[2];

for (int i = 0; i < x.length; i++)

System.out.print(x[i] + " ");

}

}

A. The program displays 1 2 3 4

B. The program displays 0 0

C. The program displays 0 0 3 4

D. The program displays 0 0 0 0

6. Given the program demonstrating linear search in Figure 17.1.1 of ch17.1, will it work if linearSearch() uses an enhanced for loop instead of a for loop? Explain and show the code if possible. Will it work if the loop in main() is replaced with an enhanced for loop? Explain and show the code if possible.

7. Rewrite the linearSearch() method in Figure 17.1.1 of ch17.1 to have it search for a string in an array of strings. Modify the main() as well to test the method.

8. David wrote a method to reverse an array but it doesn’t work. Help him figure out what’s wrong and fix the code. Be sure to explain why something is wrong.

public class Test {

public static void main(String[] args) {

String[] arr = {"Deb", "Mary", "Tom", "Victor", "White"};

reverse(arr);

logArr(arr);

} // end main

// reverse the content of the array

public static void reverse(String[] list) {

String[] temp = new String[list.length];

for (int i=0; i < list.length; i++) {

temp[i] = list[list.length-i-1];

}

list = temp;

} // end reverse

// print content of an array

public static void logArr(String[] list) {

for (int i=0; i < list.length; i++) {

System.out.print(list[i] + ", ");

}

System.out.println();

} // end logArr

} // end class Test

9. Write a method to find the last occurrence of an element in an array. Algorithm first. Test the method with assertion using those testing cases:

Example method input | Output (returned value)

{2, 4, 6, 8}, 6 | 2

{2, 4, 6, 8, 4, 6, 7}, 6 | 5

{2, 4, 8, 4, 7, 5}, 6 | -1

// returns index of the last occurrence of key in the array, or -1

// if this list doesn’t contain the element

public static int findLastCopy(int[] numbers, int key) {

// ADD code

}

10. Write a method named allPositive that receives an array named arr of double values and returns true if all the element values are positive (> 0) and returns false otherwise. Returns true if the array is empty.

public static boolean allPositive(double[] arr) {

// ADD code

}

11. Write a method to return a copy of an array. Algorithm first. This method needs to create a new array object that’s of the same length and content of the array parameter. If the array parameter is null, just return null.

public int[] copyOf(int[] list) {

// ADD code

}

// main()

int[] arr1 = {1, 2, 3};

int[] arr2 = arr1; // arr2 and arr1 points to the same array obj

int[] arr3 = copyOf(arr1); // arr3 points to a new array obj {1, 2, 3}

// now we have two independent array objects, one pointed by arr1 and arr2, and the other one pointed by arr3.

12. What is the output of the following code segment?

ArrayList<String> cities = new ArrayList<>();

cities.add("Atlanta");

cities.add("Boston");

for (int i = 1; i < cities.size(); i++)

cities.add(i, "+");

System.out.println(cities);

A. [Atlanta, Boston]

B. [Atlanta, +, Boston]

C. [Atlanta, Boston, +]

D. [Atlanta, +, Boston, +]

E. No output because the program goes into an infinite loop

13. What will be displayed by the following code?  
        ArrayList<String> list = new ArrayList<>();  
        list.add("A");  
        list.add("B");  
        list.add("C");  
        list.add("D");  
        for (int i = 0; i < list.size(); i++)  
            System.out.print(list.remove(i));

A. ABCD

B. AB

C. AC

D. AD

E. ABC

14. Which statement is correct about those two code segments (as in separate programs)?

ArrayList<Integer> list = new ArrayList<>(); list.add(3); // I

ArrayList<Double> list = new ArrayList<>(); list.add(3); // II

1. Both work.
2. Only I works.
3. Only II works.
4. Neither works.

15. Write a method that takes an ArrayList of Integer as a parameter and returns the index of the smallest element. Return the index of the first occurrence if there are multiple copies of the smallest value. Assume that the list stores at least one value. Algorithm first.

Example Input | Expected Output

[5, 4, 3, 2, 1] | 4

[5] | 0

[3, 2, 1, 4] | 2

[30, 10, 10, 30, 10] | 1

public static int indexOfMin(ArrayList<Integer> nums) {

// ADD code

}

16. Write a method which takes two parameters, an ArrayList of Integer list and an int target, and return an ArrayList which stores the indexes of all occurrences of target in list. Do not modify list.