Institute of Computer Engineering Technology

iCET Certified Master

ASSIGNMENT

Assignement	WEEK 07 - Programming Fundamentals
Name	Arrays
Ass. Date	30th December 2023

01. Creates an integer array of size 10 and name array "arr".

    I.   Store the following integer numbers into the array elements.

          12, 35, 47, 59, 62, 73, 81, 93, 111, 121

    II.   Explain how the array is created in the ram using a diagram.

    III.   Explain how to assign value to arr[0] and arr[1] by using a diagram.

    IV.   Print arr[0] , arr[3] , arr[5] elements by using System.out.println() statements.

02. Below are the average of 10 students for 3 subjects.

    85.66, 78, 67.33, 57.66, 81, 91, 53.66, 61.66, 74.33, 79.33

    I.   Create a Java array to store the average marks of students.

    II.   Print the average marks of the 3rd student and the average marks of the 7th student.

03. The following table shows the foreign exchange reserves of Sri Lanka in 2022.

Sri Lanka Foreign Exchange Reserves	
Month	USD Million
January	2362
February	2311
March	1917
April	1912
May	1887
June	1854
July	1717
August	1717
September	1779
October	1705
November	1806
December	1896

    I.   Create a Java array and store foreign exchange reserves in USD Million in a single statement.

    II.   Print elements of that array without using for loop.

    III.   Incorrect data enter for April and July. The correct data for those months is given below. Modify the array by entering the correct data.

          April – 1812   July – 1817

    IV.   Print again April and July month foreign exchange reserves.

          April - 1812

          July - 1817

04. "Institute Of Computer Engineering Technology"

    I.   Put all characters in this word into a char array(including space).

    II.   Print the elements of the array to get the following output without using for loop.

          Institute
          Of
          Computer
          Engineering
          Technology

05. Mathematics marks of students in a grade 10 class are given below.

        56 81, 43, 69, 93 54, 48, 47, 51, 79, 82, 96, 57, 61, 66

    I.   Create a Java array and store marks by using a single statement. Take "marks" as the name of the array.

    II.   What is the special way to get how many marks are input into the array?

    III.   If we insert this code after creating the array. What will be the output?

```
for(int i=0; i<5; i++){
        System.out.println(marks[i]);
}
```

    IV.   Write a program to print all marks of an array using for loop.

    V.   Write a program to print the 10th element to the last element.

06. Creates an array of strings of size 7, and fill it with the days of the week (Sunday, Monday, Tuesday, etc.).

    I.   Print the array below

       [Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday]

    II.   Print the array in reverse order.

07. Write a Java program to answer the following question.

    I.   Create an array to store Block letters.

    II.   Print that array as follows.

       [A, B, C, D, ...]

    III.   Print the block letters in the even index of an array.

    IV.   Print the block letters in the odd index of an array.

    V.   Print the array in reverse order.

08. The annual rainfall values(mm) of several districts of Sri Lanka are given below.

   2346, 1945, 2060, 1781, 2365, 1005, 1162, 1016, 1512, 2231, 1903, 12061, 1005, 1545, 2156, 2037, 1583, 3668

   I.   Create an array to store the annual rainfall values by using a single statement.
   II. Print the number of districts.
   III. Count and print the number of districts with more than 2000mm of annual rainfall.
   IV. Count and print the number of districts with less than 1000mm of annual rainfall.
   V.   Find the average annual rainfall values of all districts.

09. Which can be inserted at line 12, still the code will compile?

```
class Example{
     public static void main(String args[]){
          int[] array;
          //Insert code here //Line 12
     }
 }
```

   A. array=new int[5];   B. array=new int[10];
   C. array=new int[-5];   D. array={10, 20, 30, 40, 50};
   E. array=new int[]{10, 20, 30, 40, 50}; F. array=new int[]{};

10. When we rolling of a six-sided dice 10 times, the following results were obtained.

   6 3 3 2 4 1 6 6 2 4

   I.   Create an array to store results.
   II. Find the number of times '3' and '6' is rolled.
   III. Find the number of times odd numbers are rolled.
   IV. search whether the number '5' are rolled.

11.
```java
class Demo{
    public static void main(String s[]) {
        int[] xr=new int[3];
        System.out.println(xr[0]+" "+xr[1]+" "+xr[2]); // line 4
    }
}
```

   I.   What is the output? Explain your answer:
   II. According to that, If we create an array of char, Boolean, double, and String types without array initialization and print elements of the array, What will be the output?

12. Create an integer array to store the 9 subject marks of a student. Get subject marks by the user and store marks in the array and print the array of subject marks.
   I.   Find the total mark of the student.
   II.   Find the average mark of the student.
   III. Find the minimum mark of the student.
   IV.   Find the maximum mark of the student.
   V.   Count how many marks are greater than 75.
   VI.   Count how many marks are less than 45.
   VII. Search if the student gets 100 marks in any subject.

13. =============== program A ===============

```java
import java.util.*;
class Demo{
    public static void main(String s[]) {
        Scanner input=new Scanner(System.in);
        int[] numbers=new int[10];
        for (int i = 0; i < 10; i++){
                System.out.print("Input number "+(i+1)+" : ");
                numbers[i]=input.nextInt();
        }
        //print numbers
        System.out.print("[");
        for (int i = 0; i < 10; i++){
                System.out.print(numbers[i]+", ");
        }
        System.out.println("\b\b]");
    }
}
```

=============== program B ===============
```java
import java.util.*;
class Demo{
    public static void main(String s[]) {
        Random  r=new Random ();
        int[] numbers=new int[10];
        for (int i = 0; i < 10; i++){
                numbers[i]=r.nextInt();   // Line X
        }
        //print numbers
        System.out.print("[");
        for (int i = 0; i < 10; i++){
                System.out.print(numbers[i]+", ");
        }
        System.out.println("\b\b]");
    }
}
```

I. What is the difference between A and B programs?
II. Write how Line X changes to get numbers between 0 and 100.

14. Write a program to take the Java assignment marks of 20 students by using Random numbers and store assignment marks in the array. (0 <= assignment marks <= 100)
    I.   Print the array and find minimum marks.
    II. Count how many students pass the assignment (the assignment pass mark is 50).
    III. Search whether there are students who get more than 90.

15. Write a program that creates an integer array and the size of an array should be input by the user, and fills it with random numbers between 1 and 100 (inclusive).
    I.   Print the array by using the Arrays.toString method.
    II. Count how many odd numbers are in the odd index of an array.
    III. Search whether the number 100 is present in the array.
    IV. find the maximum and minimum values in the array.

16. ```
class Demo{
    public static void main(String s[]) {
        int[] num={10,20,30,40,50,60,70};
        System.out.println("Length : "+num.length);
        for(int i=0; i<=num.length; i++){
            System.out.println("Element at index " + i + " is " + num[i]);
        }
    }
}
```

    I.   What will be the output when compiled and run? Explain the reason for getting that output.
    II.  Correct the program and rewrite.

17. 
```java
class Demo{
    public static void main(String s[]) {
        int[] arr={10,20,30,40,50,60,70};
        int[] num=arr;
        System.out.println(Arrays.toString(num)); //Line 1
        System.out.println(Arrays.toString(arr));  //Line 2
        System.out.println("num == arr ??? "+ (num==arr));  //Line 3
        System.out.println(arr); //Line 4
    }
}
```

    I.   What will be the output when compiled and run? Explain the reason for getting that output in Line 3 and Line 4.

    II. According to that, what will be the output insert below line code as Line 5 ? Explain your answer with a diagram.

               System.out.println(num); //Line 5

18. Create a String array named "month" and store the month name.

    I. Create a new String array named "arrMonth" from the size of the "month" array and copy the value to the "arrMonth" array from the "month" array by using for loop.

    II. Insert below code line after creating an array, What will be the output ? Explain your answer.

          System.out.println("month == arrMonth ??? "+ (month==arrMonth));

19. Create an integer array of size 50 and store Random numbers and print.

    I.   Create a new array and store the values in the above array in reverse order and print it.

    II. Find the probability of getting negative numbers as Random numbers according to this output.

20. Create a char array as below and print that array.

vowels1 =[A , E , I , O , U]

vowels2 =[a , e , i , o , u]

   I.   Merge vowels1 array and vowels2 array to get the following output.

A E I O U a e i o u

   II.   Create a new array using vowels1 array and vowels2 array to get the following output.

A a E e I i O o U u

   III.   Create a new array using vowels1 array and vowels2 array to get the following output.

U u O o I i E e A a

   IV.   Create a new array using vowels1 array and vowels2 array to get the following output.

A u E o I i O e U a

21.
```java
class Demo{
    public static void main(String s[]) {
        int[] ar1 = new int[10];
        double[] dr1 = new double[10];
        //new line
    }
}
```

Which of the following assignment can be inserted at a new line, and still code will compile?

A) dr1 = ar1;   B) ar1 = dr1;   C) dr1[0] = ar1[0];

D) ar1[0] = dr1[0];   E) ar1[0]=(int)dr1[0]

22. What is the meaning of the phrase "wider conversion" in Java arrays?

   A) It refers to the process of converting a value from a narrower array type to a wider array type.

   B) It refers to the process of converting a value from a wider array type to a narrower array type.

   C) It refers to the process of converting an array from one reference type to another reference type.

   D) It refers to the process of converting an array from a primitive type to a reference type.

23. Which can be inserted at line 20, still the code will compile?

```
class Example{
    public static void main(String args[]){
        int x=0;
        int[] xr=new int[3];
        double d=0.0;
        double[] dr=new double[5];
        int[] grade={'a','b'};
        //Insert code here //Line 20
    }
}
```

A. x=xr[0];   B. xr[0]=x;   C. x=xr;
D. xr=x;   E. dr[0]=xr[0];   F. xr[0]=dr[0];
G. xr[0]=(int)dr[0];   H. xr=dr;   I. dr=(double[])xr;
J. dr=xr;   K. xr=(int)dr;   L. xr=(int[])dr;

24. After calculating the salary of five employees working in an organization, the head of the organization noticed that additional allowances were not added to their salary. After he decides to add an additional allowance to the salary. The following program was written to do that.

```
class Demo{
    public static void increment(int salary1, int salary2, int salary3, int salary4){
        salary1 +=5000;
        salary2 +=5000;
        salary3 +=5000;
        salary4 +=5000;
    }
    public static void main(String args[]){
        double[] salary={71,86,54,89};
        System.out.println(salary [0]+" "+ salary [1]+" "+ salary [2]+" "+ salary [3]); //Line 1
        increment(salary [0], salary [1], salary [2], salary [3]);   //Line 2
        System.out.println(salary [0]+" "+ salary [1]+" "+ salary [2]+" "+ salary [3]);
    }
}
```

  I.   What will be the output when compiled and run? Draw a diagram and explain the reason for getting that output.

  II.   Correct the program and rewrite.

  III.   Line1, Line3, and increment method body replace with for-each loop.

25. The monthly salaries of Sri Lankan software engineers working in a USA company. Create an array to store monthly salaries in dollars(don't insert dollar marks).

   15000$, 21000$, 18500$, 12275$, 35550$, 28760$, 17175$, 10500$

   I. Write a program to convert to Sri Lanka Rupees and copy to the new array. (1$= Rs. 366.10)

   II. Count how many software engineers get more than Rs.7,500,000 and how many software engineers get less than Rs.7,500,000.

   III. Create two arrays and store more than 7.5 million salaries and less than 7.5 million salaries in separately.

26.

96	17	54	6	81	47	63	79	32	13

   I. Creates an integer array to store the above value and name array "arr".

   II.
```
public static void sort(int[] ar){
        for(int j=0; j<3; j++){           //loop1
                if(ar[j]>ar[j+1]){
                        int t=ar[j];
                        ar[j]=ar[j+1];
                        ar[j+1]=t;
                }
        }
        for(int j=0; j<3; j++){           //loop2
                if(ar[j]>ar[j+1]){
                        int t=ar[j];
                        ar[j]=ar[j+1];
                        ar[j+1]=t;
                }
        }
        for(int j=0; j<3; j++){           //loop3
                if(ar[j]>ar[j+1]){
                        int t=ar[j];
                        ar[j]=ar[j+1];
                        ar[j+1]=t;
                }
        }
        System.out.print(Arrays.toString(ar));
}
```

   Add the above method to the program and pass the "arr" array to this method.

   What will be the output when compiled and run?

III. Draw an array diagram and explain what happens to the array in loop1, loop2, and loop3.

IV. Implement this program to sort array in ascending order.

27. Write a method for sorting dollar salary of 23 question sort in ascending order by using two for a loop.

28. Write a method "modifyArray" that takes in an integer array and returns a new array with a special user input element replace by a user input value. The new array has the same array length as the input array. Finally, print the new array and the previous array in the main method.

> Input array → [10,20,30,40]
> Replace index – 1
> Replace value – 50
> New array → [10,20,50,40]

29. Below is the subject list selected by the student for the O/L examination.

[Mathematics,Science,English,Sinhala,History,Buddhisum,Business Studies,Computer Studies]

The student has forgotten to add the "Music" subject to the list. Therefore write a method to add "Music" as the 8th subject and print the subject list again.

output

[Mathematics, Science, English, Sinhala, History, Buddhisum, Business Studies, Music, Computer Studies]

30. In question number 03, we discuss the foreign exchange reserves of Sri Lanka in 2022.

I. Write a program to copy the value from the original month array and foreign exchange reserves array to the new two arrays.

II. Write a method to get the foreign exchange reserves and month in descending order. (use the two new arrays created in the above question)

III. Print month name and the foreign exchange reserves,
   - According to the month order
   - According to the descending order of the foreign exchange reserves

31. The order of seating of grade 11 student at the prize giving ceremony is given below.

Student name array

Sachini	Tharusha	Shehan	Ashini	Sachin	Kasun	Lihini	Hashini	Ashini	Kaveesha

Student marks array (arrange in student name order)

807	796	728	801	818	746	781	756	801	812

I. Print elements of that array as below.

> Sachini – 807
> Tharusha - 796
> Shehan - 728
> Ashini - 801
> Sachin - 818
> Kasun - 746
> Lihini - 781
> Hashini - 756
> Ashini - 801
> Kaveesha - 812

II. Amesh's name has been forgotten to enter in the list. Add that student to the list and print the list again with marks. (Amesh's marks – 804)

III. One name of the order has been mentioned twice by mistake, Remove that name and print the order again. (use equals() method in String class)

IV. Finally decided to arrange name list according descending order of student marks. Print student name list according to descending order of the marks.

32.

10	20	30	40	50	60	70

When pass above array to the method , method should rearrange array as below.

20	30	40	50	60	70	10

33. Write a program to sort a binary array(which is contain 0 and 1) using a single for loop.(should 0 come forward)

34. The 100m women's Olympic games were held in Tokyo in 2021 due to the COVID 19 pandemic. Following are the top 10 times in seconds with the athlete's country from the final.

- Switzerland(2) – 11.11s
- Lvory Coast(1) – 10.86s
- Jamaica(2) – 10.76s
- United States(1) – 10.98
- United States(2) – 11.11s
- Great Britain – 11.05
- Lvory Coast(2) – 11.14s
- Jamaica(3) – 10.61s
- Switzerland(1) – 11.06s
- Jamaica(1) – 10.74s

I. Find and print Gold medal winner country and record time.
II. In 2022, gold medal given to the second place winner because undisciplined act of gold medal winner of 2021. Find and print new Gold medal winner country and record time.
III. Remove the athlete who won the gold medal in 2021 and rearrange the list in ascending order of the time and Print list with country and record time.

35.
```java
class Example{
    public static void main(String []args) {
        int[] ar={10,20,30,40,50};
        int[] br={10,20,10,40,50,60};
        int[] cr={30,30,30,30};
        int[] dr={40,10,50,20,30};
        int[] er={10,20,30,40,50};
        int[] fr={10,20,30,40};

        findDuplicate(ar); // no duplicate
        findDuplicate(br); // duplicate "10"
        findDuplicate(cr); // dupliacte "30"
        findDuplicate(dr); // no duplicate
        findDuplicate(er); // no duplicate
        findDuplicate(fr); // no duplicate

        System.out.println("ar==br : "+equals(ar,br)); //false
        System.out.println("ar==cr : "+equals(ar,cr)); //false
        System.out.println("ar==dr : "+equals(ar,dr)); //false
        System.out.println("ar==er : "+equals(ar,er)); //true
        System.out.println("ar==fr : "+equals(ar,fr)); //false
    }
}
```

Implement findDuplicate method and equals method in above program.

36. Below is the list of A/L student who play cricket and football in the school.

Cricket
  Shanaka,Dinesh,Amesh,Lahiru,Dilshan,Hashan,Wenura,Randika,Dasun, Thisara,Kasun,Nisal,Praveen

Football
  Anjana,Chamara,Kamal,Dhanuka,Shanaka,Kasun,Dineth,Sahan,Wenura, Amesh,Mahesh,Randika,Thisara

I.   Get the name list of students playing both cricket and football.(can not have duplicate names)
II. Get the name list of student playing cricket or football. (can not have duplicate name)

37. Write a program to get String input by the user and store characters of that String to the char array and finally print the char array.

38. It can be seen that the number, 125874, and its double, 251748, contain exactly the same digits, but in a different order. Write a Java program to find & print the smallest positive integer, x, such that 2x, 3x, 4x, 5x, and 6x, contain the same digits.

39. A school has a Student Registration System. When a student registers, the User should enter the admission number and student name into the system. The admission number can not be duplicated. If the user enters a duplicate admission number, the system should display "Duplicate Admission number…" and ask the user whether to enter another admission number or exit the system.

40. All clothes in Online clothing store has clothing.ClothingID is available in 1 to 1000. Customer log in online clothing system and enter the clothingID of customer selected.
   - Create an integer array to store user input.
   - Prompt the user to enter a ID and read it from the console until the user enters -1.
   - If the input ID already exists in the array, print a message indicating that it is a duplicate element and do not add it to the array.
   - If the input ID is new to the array, add it to the array.
   - After enter all selected itemId, Print the array.