***Practice exercise on Arrays***

**Loops and one-dimensional array**

**Find the output and explain what these programs do.**

int [] arr ={1, 10, 3,7,34,24,18};

for (int k=0; k < arr.length/2; k++) {

int tmp = arr[k];

int index = arr.length-(k+1);

arr[k] = arr[index];

arr[index] = tmp;

}

for (int k=0; k < arr.length -1; k++)

println(arr[k]);

Answer: 18 24 34 7 3 10

Explain: The for loop declares a variable k as an integer and sets it equal to zero. Then checks if k is less than the array length divided by two. It keeps adding one to k until k is less than the array length divided by two. Inside the for loop another variable is declared tmp as an integer set equal to the index of the array with the variable k. Another variable is declared called index as an integer and it set to the length of the array minus k+1, later we set array with the index k to array index. Again we set array index to tmp which is the array index variable k. At the end we have another for loop with the variable k as an integer set to the value zero, the loop checks if k is less than the length of the array minus one, which is 6, the loop keeps adding one to k. Inside the for loop the program prints the array with the index k on a new line.

int [] arr ={1, 10, 3,7,34,24,18};

boolean tm = true ;

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

for (int j=k; j < arr.length; j++) {

if (arr[k] == arr[j]) tm = false;

}

}

println(tm);

Answer: false

Explain: The variable tm is declared as a Boolean and is set to true.

In the for loop the variable k is declared as an integer and is set to zero. The loop checks if k is less than the array length minus one. The variable k is added by one until k is less than the array minus one. Inside the for loop we have another for loop which has a variable j and sets it equal to k then it checks if j is less than the length of the array, it keeps adding one to j until it is less than the length of the array. Inside the for loop there is an if statement where it checks it the array index k is the same as the array index j, if it is the variable tm is set to false.

Int [] arr ={1, 10, 3,7,34,24,18};

boolean tm = true ;

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

if (arr[k] > arr[k+1]) tm = false;

}

println(tm);

Answer: false

Explain: The variable tm is declared as a Boolean and set to true. The for loop there is a variable k declared as an integer set to zero, it check if k is less than the length of the array minus one, we keep adding one to k until k is less than the length of the array minus one. Inside the for loop we have an if statement where is checks if array with the index k is greater than array with the index plus one, if the statement is true it sets the variable tm to false. Outside the for loop it prints the variable tm on a new line.

int [] arr ={1, 10, 3,7,34,24,18};

boolean tm = true ;

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

if (arr[k] < arr[k+1]) tm = false;

}

println(tm);

Answer: false

Explain: The Variable tm is declared as a Boolean and set to true. The for loop has the variable k declared as an integer and set to zero, it checks it k is less than the length of the array minus one, the loop keeps adding one to k until k is less than the array length minus one. Inside the for loop there is an if statement that checks if the array with index k is less than the array with the index k plus one. If the statement is true then it sets the variable tm to false. Outside the for loop the program prints the variable tm on a new line.

|  |  |
| --- | --- |
| int [] arr ={{1, 10, 3,7,34,24,18}; |  |
| boolean tm = false |  |
| for (int k=0; k < arr.length-1; k++) {  for (int j=k+1; j < arr.length; j++) {  if (arr[k] == arr[j])  { tmp = arr[k] == arr[j] ;  }  }  }  println(tm);  Answer: false  Explain: The variable tm is declared as a Boolean and set to false. The for loop has the variable k declared as an integer set to zero, the loop checks if k is less than the length of the array minus one, it keeps adding one to k until k is less than the length of the array minus one. Inside the for loop we have another for loop with the variable j declared as and integer set to k plus one, it keeps checking until j is less than the length of the array. Inside that for loop there is an if statement that checks if the array with the index k is the same as the array with the index j. If the statement is true then it sets the variable tmp to array index k the same as array index j but this if statement is false, everything inside it does not run. Outside the for loop the program prints the variable tmp on a new line. |  |
| int [] arr ={1, 10, 3,7,34,24,18}; largest  int tmp = arr[0];  for (int k=1; k < arr.length; k++) {  if (arr[k] > tmp) tmp = arr[k];  }  print (tmp);  Answer: 34  Explain: The variable tmp is declared as an integer and set to the first value of the array which is 1. The for loop declares k as an integer and sets it to 1, the for loop checks if k is less than the length of the array, it keeps adding one to k until this statement is true. Inside the for loop there is an if statement that checks if array with the index k is greater than the variable tmp. If the statement is true then the variable tmp is set to array with the index k. In the end the following code gives us the largest number in the array.  int [] arr ={1, 10, 3,7,34,24,18}; average  int tmp = 0;  for (int k=0; k < arr.length; k++) {  tmp += arr[k];  }  println((double)tmp/arr.length;)  Answer: 13.857142857142858  Explain: This code gives us the average of the numbers in the array by adding all the numbers and dividing by how many there are in the array.    int [] arr ={1, 10, 3,7,34,24,18, -100};  int tmp = 0;  for (int k=0; k < arr.length; k++) {  tmp += arr[k];  }  print(tmp > 0);  Answer: false  Explain: The variable tmp is declared as an integer and set to the value zero. The for loop has the variable k declared as an integer and also set to zero, the for loop checks if k is less than the length of the array which is eight, it keeps adding one to k until k is greater than the length of the array. Inside the for loop it adds the value of array index k to the variable tmp. At the end of the program it prints and checks if tmp is greater than 0 which it is not as a result it prints false in the console of processing.  int [] arr ={1, 10, 3,7,34,1,18};  boolean tm = false; |  |
| for (int k=1; k < arr.length-1; k++) {  if (arr[0] == arr[k])  {  tm = arr[0]==arr[k];  break;  }  }  println(tm);  Answer: true |  |

Explain: In the following example of code there is a variable declared as arr filled with seven numbers and a variable tm set to false declared as a Boolean. The for loop declares the variable k and sets it equal to one, then the loop checks if k is less than the length of the array minus one, finally the loop keeps adding one to k until the statement is false. In the for loop there is an if statement that checks if array with the index zero is the same as array with the index k, after the code breaks. Outside the for loop the program prints the variable tm on a new line in the console.

int [] arr ={1, 10, 3,7,1,24,18, 1, 35, 2, 1};

int tmp = 0;

for (int k=1; k < arr.length; k++) {

if (arr[k] == arr[0]) tmp++;

}

println(tmp);

Answer: 3

Explain: In the code there is an array called arr declared as an integer with eleven numbers in it. There is also the variable tmp declared as an integer set to zero. In the for loop there is another variable k declared as an integer set to the value one, then the for loop checks if k is less than the length of the array, it keeps adding one to k until this is false. Inside the for loop there is an if statement that checks if array with the index k is the same as array with the index zero which is one in the array arr, if the statement is true then it adds one to the variable tmp. Outside the for loop the program prints the variable tmp on a new line inside the console.

**Queistion 1**

**Write a program that generates 100 random integers between 1 to 100 and stores them in an array and prints the largest, smallest and the average.**

**Question 2**

**Write a program declares an array of 10 initialise the array with a random number between 0 to 9 . The array is then updated the hold the square of the original values**

**Question 3**

**Write a program declares an array of 10 initialise the array with a random number between 0 to 9 . The array is then updates such that**

**We add to each number the number that follows in the array. Skip the last value in the array.**

**Question 4**

**Write a program that generates 100 random integers between 0 to 100 and stores them any array and prints the largest, smallest and the average. The program then sorts prints the array in ascending order.**

**Question 5**

**Write a program that generates 100 random integers between 0 to 100 and stores them any array and prints the largest, smallest and the average. The program then search for value of the users choice the program prints ‘yes‘ if the users value is contained in the array and ‘No’ otherwise.**

**Question 6**

**Write a program that takes string and character and prints true the chosen character in contained in the string and false otherwise.**

**Question 7**

**Write a program that takes a string and store its characters in array of char.**

**Modify your program to print the number of the character ‘a’ the string.**