**Assignment** 1: Array Basics in Java

**Duration: 30 minutes**

**Assignment Description**:

This  **Assignment** covers the fundamental concepts of arrays and their implementation. Students are expected to understand the basic properties of arrays and write code to perform simple operations on arrays.

**Questions**:

Static vs Dynamic Arrays: Explain the concept of a static array and a dynamic array. What are the advantages and disadvantages of each?

Solution:

Static arrays have a fixed size and cannot change, while dynamic arrays can resize dynamically.

Static arrays have a constant-time access, while dynamic arrays have amortized constant-time access but may require resizing.

Static arrays have less memory overhead, but dynamic arrays may lead to memory waste due to over-allocations.

Reverse a String: Write a Java function to reverse a given string without using any built-in string reverse functions.

Solution:

java

public static String reverseString(String input) {

char[] characters = input.toCharArray();

int left = 0;

int right = characters.length - 1;

while (left < right) {

char temp = characters[left];

characters[left] = characters[right];

characters[right] = temp;

left++;

right--;

}

return new String(characters);

}

Merge Sorted Arrays: Given two sorted arrays, write a Java function to merge them into a single sorted array. Analyze the time complexity of your solution.

Solution:

java

public static int[] mergeSortedArrays(int[] arr1, int[] arr2) {

int[] result = new int[arr1.length + arr2.length];

int i = 0, j = 0, k = 0;

while (i < arr1.length && j < arr2.length) {

if (arr1[i] < arr2[j]) {

result[k++] = arr1[i++];

} else {

result[k++] = arr2[j++];

}

}

while (i < arr1.length) {

result[k++] = arr1[i++];

}

while (j < arr2.length) {

result[k++] = arr2[j++];

}

return result;

}