Prefix and Suffix Sum - When to Use

1. Prefix and Suffix Sum - When to Use:

Problem: Prefix and suffix sums are techniques to optimize problems where you need to perform multiple range queries.

Approach:

- Prefix sum: Precompute the sum of elements from the start to each index.
- Suffix sum: Precompute the sum of elements from the end to each index.

Scenarios:

1. **Range Sum Queries:** If you need to compute the sum of elements in a range multiple times, prefix and suffix sums can help reduce time complexity.
2. **Subarray Problems:** When solving problems related to subarrays, prefix and suffix sums can be used to compute the sum efficiently.
3. **Prefix Sums for Maximum Subarray Sum:** Calculate the sum of subarrays in constant time using prefix sums.

Java Code for Prefix Sum:

```
public class Solution {
    public int[] prefixSum(int[] arr) {
        int n = arr.length;
        int[] prefix = new int[n];
        prefix[0] = arr[0];
        for (int i = 1; i < n; i++) {
            prefix[i] = prefix[i - 1] + arr[i];
        }
```

```
        return prefix;
    }
}
```

Explanation: The prefix sum array is built by adding the current element to the sum of the previous elements.

Java Code for Suffix Sum:

```
public class Solution {
    public int[] suffixSum(int[] arr) {
        int n = arr.length;
        int[] suffix = new int[n];
        suffix[n - 1] = arr[n - 1];
        for (int i = n - 2; i >= 0; i--) {
            suffix[i] = suffix[i + 1] + arr[i];
        }
        return suffix;
    }
}
```

Explanation: The suffix sum array is built by adding the current element to the sum of the next elements.