**Arrays Assignment — 20 Problems**

**🔹 Phase 1: Basic Array Operations**

1. **Insert an element at a given position**  
   Input: {10, 20, 30, 40}, insert 25 at position 2 → {10, 20, 25, 30, 40}
2. **Delete an element at a given position**  
   Input: {5, 10, 15, 20}, delete at position 1 → {5, 15, 20}
3. **Linear search**  
   Search for 15 in {3, 6, 9, 12} → Found at index 2
4. **Left shift by 1**  
   {1, 2, 3, 4, 5} → {2, 3, 4, 5, 0}
5. **Right shift by 1**  
   {1, 2, 3, 4, 5} → {0, 1, 2, 3, 4}
6. **Left rotation by k**  
   {1, 2, 3, 4, 5}, k = 2 → {3, 4, 5, 1, 2}
7. **Right rotation by k**  
   {1, 2, 3, 4, 5}, k = 3 → {3, 4, 5, 1, 2}
8. **Reverse an array**  
   {1, 2, 3, 4} → {4, 3, 2, 1}

**🔹 Phase 2: Built-in Java Array Tools**

1. **Sort using Arrays.sort()**  
   {4, 2, 9, 1} → {1, 2, 4, 9}
2. **Binary search using Arrays.binarySearch()**  
   Search 7 in {1, 3, 5, 7, 9} → returns index 3
3. **Copy first 3 elements using Arrays.copyOf()**  
   {1, 2, 3, 4, 5} → {1, 2, 3}
4. **Copy range 2 to 4 using Arrays.copyOfRange()**  
   {1, 2, 3, 4, 5} → {3, 4}
5. **Check equality of two arrays using Arrays.equals()**  
   {1, 2, 3} and {1, 2, 3} → true
6. **Fill entire array with a value using Arrays.fill()**  
   {0, 0, 0} → {7, 7, 7}

**🔹 Phase 3: Thinking & Manipulation**

1. **Remove duplicates from a sorted array**  
   {1, 1, 2, 2, 3} → {1, 2, 3}
2. **Merge two arrays**  
   {1, 3, 5}, {2, 4, 6} → {1, 2, 3, 4, 5, 6}
3. **Count occurrences of an element**  
   {1, 2, 2, 3, 2}, find 2 → 3 times
4. **Check if array is palindrome**  
   {1, 2, 3, 2, 1} → true
5. **Move all zeros to the end**  
   {0, 1, 0, 3, 12} → {1, 3, 12, 0, 0}
6. **Sort array without built-in method (Bubble sort)**  
   {5, 3, 8, 4} → {3, 4, 5, 8}