6(a)

import java.util.\*;

class CountingSort {

void countSort(int arr[]) {

int n = arr.length;

int max = Arrays.stream(arr).max().getAsInt();

int[] count = new int[max + 1];

for (int num : arr) count[num]++;

for (int i = 1; i <= max; i++) count[i] += count[i - 1];

int[] output = new int[n];

for (int i = n - 1; i >= 0; i--) {

output[count[arr[i]] - 1] = arr[i];

count[arr[i]]--;

}

System.arraycopy(output, 0, arr, 0, n);

}

public static void main(String[] args) {

int arr[] = {4, 2, 2, 8, 3, 3};

CountingSort cs = new CountingSort();

cs.countSort(arr);

System.out.println("Sorted array: " + Arrays.toString(arr));

}

}

6(b)

import java.util.\*;

class RadixSort {

void countSort(int arr[], int exp) {

int n = arr.length;

int[] output = new int[n];

int[] count = new int[10];

for (int i = 0; i < n; i++)

count[(arr[i] / exp) % 10]++;

for (int i = 1; i < 10; i++)

count[i] += count[i - 1];

for (int i = n - 1; i >= 0; i--) {

output[count[(arr[i] / exp) % 10] - 1] = arr[i];

count[(arr[i] / exp) % 10]--;

}

System.arraycopy(output, 0, arr, 0, n);

}

void radixSort(int arr[]) {

int max = Arrays.stream(arr).max().getAsInt();

for (int exp = 1; max / exp > 0; exp \*= 10)

countSort(arr, exp);

}

public static void main(String[] args) {

int arr[] = {170, 45, 75, 90, 802, 24};

RadixSort rs = new RadixSort();

rs.radixSort(arr);

System.out.println("Sorted array: " + Arrays.toString(arr));

}

}

6©

import java.util.\*;

class HeapSort {

void heapify(int arr[], int n, int i) {

int largest = i, l = 2 \* i + 1, r = 2 \* i + 2;

if (l < n && arr[l] > arr[largest]) largest = l;

if (r < n && arr[r] > arr[largest]) largest = r;

if (largest != i) {

int temp = arr[i]; arr[i] = arr[largest]; arr[largest] = temp;

heapify(arr, n, largest);

}

}

void heapSort(int arr[]) {

int n = arr.length;

for (int i = n / 2 - 1; i >= 0; i--) heapify(arr, n, i);

for (int i = n - 1; i > 0; i--) {

int temp = arr[0]; arr[0] = arr[i]; arr[i] = temp;

heapify(arr, i, 0);

}

}

public static void main(String[] args) {

int arr[] = {12, 11, 13, 5, 6, 7};

HeapSort hs = new HeapSort();

hs.heapSort(arr);

System.out.println("Sorted array: " + Arrays.toString(arr));

    }

}