Rajalakshmi Engineering College

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 5_MCQ

Attempt : 1
Total Mark : 15
Marks Obtained : 15

Section 1 : MCQ

1. Which of the following is the correct in-order traversal of a binary search tree with nodes: 9, 3, 5, 11, 8, 4, 2?

Answer

2, 3, 4, 5, 8, 9, 11

Status : Correct   *Marks : 1/1*

2. Which of the following operations can be used to traverse a Binary Search Tree (BST) in ascending order?

Answer

Inorder traversal

Status : Correct   *Marks : 1/1*

3. Which of the following is a valid preorder traversal of the binary search tree with nodes: 18, 28, 12, 11, 16, 14, 17?

Answer

18, 12, 11, 16, 14, 17, 28

Status : Correct   *Marks : 1/1*

4. Which of the following is the correct pre-order traversal of a binary search tree with nodes: 50, 30, 20, 55, 32, 52, 57?

Answer

50, 30, 20, 32, 55, 52, 57

Status : Correct   *Marks : 1/1*

5. Which of the following is the correct post-order traversal of a binary search tree with nodes: 50, 30, 20, 55, 32, 52, 57?

Answer

20, 32, 30, 52, 57, 55, 50

Status : Correct   *Marks : 1/1*

6. Find the postorder traversal of the given binary search tree.

Answer

1, 4, 2, 18, 14, 13

Status : Correct   *Marks : 1/1*

7. While inserting the elements 71, 65, 84, 69, 67, 83 in an empty binary search tree (BST) in the sequence shown, the element in the lowest level is _____.

Answer

67

Status : Correct   *Marks : 1/1*

8.   Find the pre-order traversal of the given binary search tree.

Answer

13, 2, 1, 4, 14, 18

Status : Correct   *Marks : 1/1*

9.   While inserting the elements 5, 4, 2, 8, 7, 10, 12 in a binary search tree, the element at the lowest level is _____.

Answer

12

Status : Correct   *Marks : 1/1*

10.   Find the post-order traversal of the given binary search tree.

Answer

10, 17, 20, 18, 15, 32, 21

Status : Correct   *Marks : 1/1*

11.   Find the in-order traversal of the given binary search tree.

Answer

1, 2, 4, 13, 14, 18

Status : Correct   *Marks : 1/1*

12. How many distinct binary search trees can be created out of 4 distinct keys?

Answer

14

Status : Correct   *Marks : 1/1*

13. Find the preorder traversal of the given binary search tree.

Answer

9, 2, 1, 6, 4, 7, 10, 14

Status : Correct   *Marks : 1/1*

14. In a binary search tree with nodes 18, 28, 12, 11, 16, 14, 17, what is the value of the left child of the node 16?

Answer

14

Status : Correct   *Marks : 1/1*

15. The preorder traversal of a binary search tree is 15, 10, 12, 11, 20, 18, 16, 19. Which one of the following is the postorder traversal of the tree?

Answer

11, 12, 10, 16, 19, 18, 20, 15

Status : Correct   *Marks : 1/1*

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 6_COD_Question 1

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

John and Mary are collaborating on a project that involves data analysis. They each have a set of age data, one sorted in ascending order and the other in descending order. However, their analysis requires the data to be in ascending order.

Write a program to help them merge the two sets of age data into a single sorted array in ascending order using merge sort.

Input Format

The first line of input consists of an integer N, representing the number of age values in each dataset.

The second line consists of N space-separated integers, representing the ages of participants in John's dataset (in ascending order).

The third line consists of N space-separated integers, representing the ages of participants in Mary's dataset (in descending order).

Output Format

The output prints a single line containing space-separated integers, which represents the merged dataset of ages sorted in ascending order.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
1 3 5 7 9
10 8 6 4 2

Output: 1 2 3 4 5 6 7 8 9 10

Answer

```c
#include <stdio.h>

void merge(int arr[], int left[], int right[], int left_size, int right_size) {
    int i = 0, j = 0, k = 0;

    while (i < left_size && j < right_size) {
        if (left[i] < right[j]) {
            arr[k++] = left[i++];
        } else {
            arr[k++] = right[j++];
        }
    }
    while (i < left_size) {
        arr[k++] = left[i++];
    }
    while (j < right_size) {
        arr[k++] = right[j++];
    }
}
void mergeSort(int arr[], int size) {
    if (size < 2) return;
    int mid = size / 2;
```

```c
    int left[mid], right[size - mid];
    for (int i = 0; i < mid; i++) {
        left[i] = arr[i];
    }
    for (int i = mid; i < size; i++) {
        right[i - mid] = arr[i];
    }

    mergeSort(left, mid);
    mergeSort(right, size - mid);
    merge(arr, left, right, mid,size-mid);
}

int main() {
    int n, m;
    scanf("%d", &n);
    int arr1[n], arr2[n];
    for (int i = 0; i < n; i++) {
        scanf("%d", &arr1[i]);
    }
    for (int i = 0; i < n; i++) {
        scanf("%d", &arr2[i]);
    }
    int merged[n + n];
    mergeSort(arr1, n);
    mergeSort(arr2, n);
    merge(merged, arr1, arr2, n, n);
    for (int i = 0; i < n + n; i++) {
        printf("%d ", merged[i]);
    }
    return 0;
}
```

Status : Correct   *Marks : 10/10*

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REC_DS using C_Week 6_COD_Question 2

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Nandhini asked her students to arrange a set of numbers in ascending order. She asked the students to arrange the elements using insertion sort, which involves taking each element and placing it in its appropriate position within the sorted portion of the array.

Assist them in the task.

Input Format

The first line of input consists of the value of n, representing the number of array elements.

The second line consists of n elements, separated by a space.

Output Format

The output prints the sorted array, separated by a space.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
67 28 92 37 59
Output: 28 37 59 67 92

Answer

```c
#include <stdio.h>
void insertionSort(int arr[], int n) {
    for (int i = 1; i < n; i++) {
        int key = arr[i]; // Element to be inserted
        int j = i - 1;

        // Move elements of arr[0..i-1], that are greater than key,
        // to one position ahead of their current position
        while (j >= 0 && arr[j] > key) {
            arr[j + 1] = arr[j];
            j = j - 1;
        }
        arr[j + 1] = key; // Place the key in its correct position
    }
}

// Function to print the array
void printArray(int arr[], int n) {
    for (int i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }
    printf("\n");
}

int main() {
    int n;
    scanf("%d", &n);
    int arr[n];
    for (int i = 0; i < n; i++) {
```

```c
        scanf("%d", &arr[i]);
    }

    insertionSort(arr, n);
    printArray(arr, n);
    return 0;
}
```

Status : Correct   ***Marks : 10/10***

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 6_COD_Question 3

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

You are the lead developer of a text-processing application that assists writers in organizing their thoughts. One crucial feature is a character-sorting service that helps users highlight the most critical elements of their text.

To achieve this, you decide to enhance the service to sort characters in descending order using the Quick-Sort algorithm. Implement the algorithm to efficiently rearrange the characters, ensuring that it is sorted in descending order.

Input Format

The first line of the input consists of a positive integer value N, representing the number of characters to be sorted.

The second line of input consists of N space-separated lowercase alphabetical characters.

Output Format

The output displays the set of alphabetical characters, sorted in descending order.

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 5
a d g j k
Output: k j g d a

Answer

```c
#include <stdio.h>
#include <string.h>

void swap(char* a, char* b) {
    char temp = *a;
    *a = *b;
    *b = temp;
}

int partition(char arr[], int low, int high) {
    char pivot = arr[high];
    int i = low - 1;

    for (int j = low; j < high; j++) {
        if (arr[j] > pivot) {
            i++;
            swap(&arr[i], &arr[j]);
        }
    }

    swap(&arr[i + 1], &arr[high]);
    return i + 1;
}
```

```c
void quicksort(char arr[], int low, int high) {
    if (low < high) {
        int pi = partition(arr, low, high);

        quicksort(arr, low, pi - 1);
        quicksort(arr, pi + 1,high);
    }
}

int main() {
    int n;
    scanf("%d", &n);

    char characters[n];

    for (int i = 0; i < n; i++) {
        char input;
        scanf(" %c", &input);
        characters[i] = input;
    }

    quicksort(characters, 0, n - 1);

    for (int i = 0; i < n; i++) {
        printf("%c ", characters[i]);
    }

    return 0;
}
```

Status : Correct   *Marks : 10/10*

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REC_DS using C_Week 6_COD_Question 4

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Kavya, a software developer, is analyzing data trends. She has a list of integers and wants to identify the nth largest number in the list after sorting the array using QuickSort.

To optimize performance, Kavya is required to use QuickSort to sort the list before finding the nth largest number.

Input Format

The first line of input consists of an integer n, representing the size of the array.

The second line consists of n space-separated integers, representing the elements of the array nums.

The third line consists of an integer k, representing the position of the largest

number you need to print after sorting the array.

Output Format

The output prints the k-th largest number in the sorted array (sorted in ascending order).

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 6
-1 0 1 2 -1 -4
3
Output: 0

Answer

```c
#include <stdio.h>
#include <stdlib.h>

int partition(int arr[], int low, int high) {
    int pivot = arr[high];  // Choose the last element as pivot
    int i = low - 1;

    for (int j = low; j < high; j++) {
        if (arr[j] <= pivot) {
            i++;
            // Swap arr[i] and arr[j]
            int temp = arr[i];
            arr[i] = arr[j];
            arr[j] = temp;
        }
    }

    int temp = arr[i + 1];
    arr[i + 1] = arr[high];
    arr[high] = temp;

    return i + 1;
}
void quickSort(int arr[], int low, int high) {
```

```c
    if (low < high) {
        int pi = partition(arr, low, high);
        quickSort(arr, low, pi - 1);
        quickSort(arr, pi + 1, high);
    }
}

void findNthLargest(int* nums, int n, int k) {
    quickSort(nums, 0, n - 1);
    printf("%d\n", nums[n - k]);
}

int main() {
    int n, k;
    scanf("%d", &n);
    int* nums = (int*)malloc(n * sizeof(int));
    for (int i = 0; i < n; i++) {
        scanf("%d", &nums[i]);
    }
    scanf("%d", &k);
    findNthLargest(nums, n, k);
    free(nums);
    return 0;
}
```

Status : Correct   *Marks : 10/10*

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 6_COD_Question 5

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Jose has an array of N fractional values, represented as double-point numbers. He needs to sort these fractions in increasing order and seeks your help.

Write a program to help Jose sort the array using the merge sort algorithm.

Input Format

The first line of input consists of an integer N, representing the number of fractions to be sorted.

The second line consists of N double-point numbers, separated by spaces, representing the fractions array.

Output Format

The output prints N double-point numbers, sorted in increasing order, and rounded to three decimal places.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 4
0.123 0.543 0.321 0.789
Output: 0.123 0.321 0.543 0.789

Answer

```c
#include <stdio.h>
#include <stdlib.h>

int compare(double a, double b) {
    return a < b;  // Return true if a should come before b
}

void merge(double arr[], int l, int m, int r) {
    int n1 = m - l + 1;
    int n2 = r - m;

    double L[n1], R[n2];

    for (int i = 0; i < n1; i++)
        L[i] = arr[l + i];
    for (int j = 0; j < n2; j++)
        R[j] = arr[m + 1 + j];

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

    while (i < n1 && j < n2) {
        if (compare(L[i], R[j])) {
            arr[k++] = L[i++];
        } else {
            arr[k++] = R[j++];
        }
    }
}
```

```c
        while (i < n1)
            arr[k++] = L[i++];
        while (j < n2)
            arr[k++] = R[j++];
    }

    void mergeSort(double arr[], int l, int r) {
        if (l < r) {
            int m = l + (r - l) / 2;

            mergeSort(arr, l, m);
            mergeSort(arr, m + 1, r);

            merge(arr, l,m,r);
        }
    }
    int main() {
        int n;
        scanf("%d", &n);
        double fractions[n];
        for (int i = 0; i < n; i++) {
            scanf("%lf", &fractions[i]);
        }
        mergeSort(fractions, 0, n - 1);
        for (int i = 0; i < n; i++) {
            printf("%.3f ", fractions[i]);
        }
        return 0;
    }
```

Status : Correct   *Marks : 10/10*