

Assignment

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Data Structure & Algo

ID # 13723

Masood Said

Task 1

(a) Insertion Sort:-

```
#include <bits/stdc++.h>
```

```
using namespace std;
```

```
void insertionSort (int arr[], int n)
```

```
{
```

```
    int i, key, j;
```

```
    for (i = 1; i < n; i++)
```

```
        key = arr[i];
```

```
        j = i - 1;
```

```
        while (j >= 0 && arr[j] > key)
```

```
        {
```

```
            arr[j+1] = arr[j];
```

```
            j = j - 1;
```

```
        }
```

```
        arr[j+1] = key
```

```
    }
```

```
}
```

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```
void printArray (int arr[], int n)
```

```
{
```

```
    int i;
```

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

```
        cout << arr[i] << " ";
```

```
    cout << endl;
```

```
}
```

Driver Code

```
int main ()
```

```
{
```

```
    int arr[] = {12, 30, 14, 9, 10, 12, 7, 9, 0};
```

```
    int n = size of arr (size of arr[0]);
```

```
    insertion sort (arr, n);
```

```
    printArray (arr, n);
```

```
    return 0;
```

```
}
```

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(b) Bubble Sort:-

```
#include <bits/stdc++.h>
```

```
using namespace std;
```

```
void swap (int *xp, int *yp)
```

```
{
```

```
    int temp = *yp;
```

```
    *xp = *yp;
```

```
    *yp = temp;
```

```
}
```

```
void bubble sort (int arr[], int n)
```

```
{
```

```
    int i, j;
```

```
    for (i = 0; i < n - 1; i++)
```

```
        for (j = 0; j < n - i - 1; j++)
```

```
            if (arr[j] > arr[j+1])
```

```
                swap (&arr[j], &arr[j+1]);
```

```
}
```

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```
void printArray (int arr[], int size)
{
    int i;
    for (i=0; i<size; i++)
        cout << arr[i] << " ";
    cout endl;
}

int main()
{
    int arr[] = {12, 30, 14, 9, 10, 12, 7, 9, 0};
    int n = size of arr) /size of arr[0];
    bubble sort (arr, n);
    cout << "sorted array: \n";
    printArray (arr, n);
    return 0;
}
```

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(c) Selection Sort :-

```
#include <bits/stdc++.h>
using namespace std;
void swap (int *xp, int *yp)
{
    int temp = *xp;
    *xp = *yp;
    *yp = temp;
}
void selectionSort (int arr[], int n)
{
    int i, j, min_idx;
    for (i=0; i<n-1; i++)
    {
        min_idx = i;
        for (j=i+1; j<n; j++)
            if (arr[j] < arr[min_idx])
                min_idx = j;
        swap (&arr[min_idx], &arr[i])
    }
}
```



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```
void printArray (int arr[], int size)
```

```
{
```

```
    int i;
```

```
    for (i = 0; i < size; i++)
```

```
        cout << arr[i] << " ";
```

```
    cout << endl;
```

```
}
```

```
int main ()
```

```
    int arr[] = {12, 30, 14, 9, 10, 12, 7, 9, 0};
```

```
    int n = sizeof (arr) / sizeof (arr[0]);
```

```
    SelectionSort (arr, n);
```

```
    cout << "Sorted array: \n";
```

```
    printArray (arr, n);
```

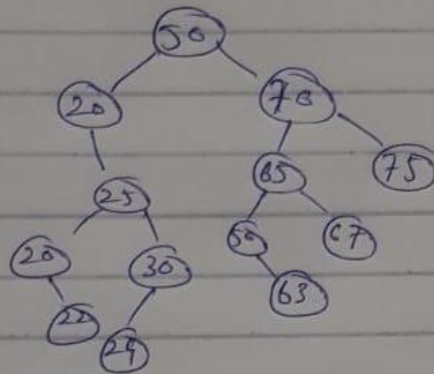
```
    return 0;
```

```
}
```

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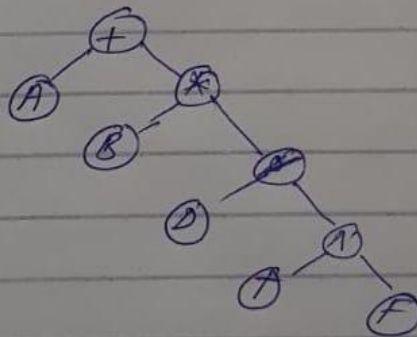
Task # 2

Binary Tree:-



Task # 3

(1)  $A + B * D / 1^A$



(2)  $(M * N) / 3 - A * G$

