

TY. B. Tech.

Design & Analysis of Algorithm

Assignment No: 1

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Assignment No: 1**Q. Find kth largest element in the array****Code:**

```
//find kth largest element in the array
int main(int argc, char const *argv[])
{
    vector<int> arr={2,7,11,5,3,4,5,3,2,1,2,3,4};
    int k = 3;
    unordered_map<int,int> mp;
    priority_queue<pair<int,int>> q;
    for(int i=0;i<arr.size();i++){
        mp[arr[i]]++;
    }
    for(auto it:mp){
        q.push({it.first, it.second});
    }
    k--;
    while(k--){
        q.pop();
    }
    cout<<q.top().first;
    return 0;
}
```

```
PS E:\vs code\C++> cd "e:\vs code\C++\" ; if
5
PS E:\vs code\C++> █
```

Q.Find duplicates in the array

```
//Find duplicates in the array
int main(int argc, char const *argv[])
{
    vector<int> arr={2,7,11,5,3,4,5,3,2,1,2,3,4};
    vector<int> ans;
    unordered_map<int,int> mp;
    for(int i=0;i<arr.size();i++){
        mp[arr[i]]++;
    }
    for(auto it:mp){
```

```

        if(it.second > 1){
            ans.push_back(it.first);
        }
    }
    for(int i=0;i<ans.size();i++){
        cout<<ans[i]<<" ";
    }
    return 0;
}
//also we can solve this problem by sorting the array and then iterating the array by
checking adjacent elements

```

```

PS E:\vs code\C++> cd "e:\vs
2 4 5 3
PS E:\vs code\C++> 

```

Q. Check if number is prime or not

```

//check if number is prime
int main(int argc, char const *argv[])
{
    int n = 19, flag = 0;
    for(int i=2;i*i<n;i++){
        if(n%i == 0){
            flag++;
            break;
        }
    }
    if(flag == 1)
        cout<<n<<" is not a prime number"<<endl;
    else
        cout<<n<<" is a prime number"<<endl;
    return 0;
}

```

```

PS E:\vs code\C++> cd "e:
19 is a prime number
PS E:\vs code\C++> 

```

Q. Find transpose of matrix

```

//transpose of matrix
int main(int argc, char const *argv[])
{
    vector<vector<int>> vec = { { 1, 1, 1, 1 },
                               { 2, 2, 2, 2 },
                               { 3, 3, 3, 3 },
                               { 4, 4, 4, 4 } };
    for(int i=0;i<vec.size();i++){
        for(int j=0;j<i;j++){

```

```

        if(i == j)
            continue;

        swap(vec[i][j], vec[j][i]);
    }
}

for(int i=0;i<vec.size();i++){
    for(int j=0;j<vec[0].size();j++){
        cout<<vec[i][j]<<" ";
    }
    cout<<endl;
}
return 0;
}

```

```

PS E:\vs code\C++> cd "e:\v
1 2 3 4
1 2 3 4
1 2 3 4
1 2 3 4
PS E:\vs code\C++> 

```

Q. find angle between two vectors

```

//find angle between two vectors
//cos(theta) = a.b/(|a|*|b|)
int main(int argc, char const *argv[])
{
    vector<int> a={1,2};
    vector<int> b={3,4};
    double a_mod = sqrt((a[0]*a[0]) + (a[1]*a[1]));
    double b_mod = sqrt((b[0]*b[0]) + (b[1]*b[1]));
    int sum = 0;
    for(int i=0;i<a.size();i++){
        sum += a[i]*b[i];
    }
    cout<<"radian - "<<acos((double)(sum)/(a_mod*b_mod))<<endl;
    cout<<"degree - "<<acos((double)(sum)/(a_mod*b_mod))* 180 / 3.141592;
    return 0;
}

```

```

PS E:\vs code\C++> cd "e
radian - 0.179853
degree - 10.3048
PS E:\vs code\C++> 

```

(This page marks the end of the assignment)