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আন্তর্জাতিক ইসলামী বিশ্ববিদ্যালয় চট্টগ্রাম

الجامعة الإسلامية العالمية شيتاغونغ

International Islamic University Chittagong

Assignment

Assignment No. – 01

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Course Title- Data Structure (Lab)

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Problem No. & Statement	*1. Write a program to find the largest number from a given list of integers.*

```cpp
#include<iostream>
using namespace std;

int main()
{
    int n;
    cin >> n;

    int myar[n+32];
    int max= myar[1];
    for(int i= 1; i<=n; i++)
    {
        cin >> myar[i];
        if(max<myar[i])
        max= myar[i];
    }

    cout << max << " is the largest number in the Array." << endl;

    return 0;
}
```

Problem No. & Statement	*2. Write a program to calculate the roots of the quadratic equation $ax^2 + bx + c = 0$, where a, b and c are known.*

```cpp
/*
Author: Sorowar Mahabub
                        ID: C201032, Section: 3AM, CSE, IIUC
*/



#include<bits/stdc++.h>
using namespace std;

int main() {

    double a, b, c, x1, x2, d, rP, iP;
    cin >> a >> b >> c;
    d= b*b - 4*a*c;
    if(d > 0)
    {
        x1= (-b + sqrt(d)) / (2*a);
        x2= (-b - sqrt(d)) / (2*a);
        cout << "Roots are real and different." << endl;
        cout << "x1= " << x1 << " and x2= " << x2 << endl;
    }
    else if(d == 0) {
        cout << "Roots are real and same." << endl;
        x1 = -b/(2*a);
        cout << "x1= " << x1 << " and x2= " << x1 << endl;
    }
    else
    {
        rP= -b/(2*a);
        iP= sqrt(-d)/(2*a);
        cout << "Roots are complex and different." << endl;
    }

    return 0;
}
```

Problem No. & Statement	*3. Write a program to create an array of n elements to read the marks of n students and then count how many students passed [pass marks ≥ 40] in the examination.*

```cpp
/*
Author: Sorowar Mahabub
                        ID: C201032, Section: 3AM, CSE, IIUC
*/



#include<iostream>
using namespace std;

int main()
{
    int n, cnt= 0;
    cin >> n;

    int myar[n+32];
```

```
    for(int i= 1; i<=n; i++)
    {
        cin >> myar[i];
        if(myar[i]>=40)
            cnt++;
    }

    cout << cnt << " students
are Passed!" << endl;
    return 0;
}
```

Problem No. & Statement	*4. Write a program to create an array of n elements and then insert an element to the list.*

```
#include<iostream>
using namespace std;

int main()
{
    int n, item, k;
    cin >> n >> k >> item;

    int myar[n+32];
    for(int i= 1; i<=n; i++)
        cin >> myar[i];

    int j= n;
    while(j>=k)
    {
        myar[j+1]= myar[j];
        j--;
    }
    myar[k]= item;
    n= n+1;

    for(int i= 1; i<=n; i++)
        cout << myar[i] << " ";
        cout << endl;
    return 0;
}
```

Problem No. & Statement	*5. Write a program to create an array of n elements and then delete an element from the list.*

```
#include<iostream>
using namespace std;

int main()
{
    int n, k;
    cin >> n >> k;

    int myar[n+32];
    for(int i= 1; i<=n; i++)
        cin >> myar[i];

    int item= myar[k];
    cout << item << " is deleted
successfully!" << endl;

    for(int j= k; j<=n-1; j++)
        myar[j]= myar[j+1];

    n= n-1;
    for(int i= 1; i<=n; i++)
        cout << myar[i] << " ";
    cout << endl;

    return 0;
}
```

Problem No. & Statement	*6. Write a program to sort n numbers using Bubble Sort algorithm.*

```
#include<iostream>
using namespace std;

int main()
{
    int n;
    cin >> n;

    int myar[n+32];
    for(int i= 1; i<=n; i++)
        cin >> myar[i];

    for(int k= 1; k<=n-1; k++)
    {
        int ptr= 1;
        while(ptr<=n-k)
        {

if(myar[ptr]>myar[ptr+1])
            {
                int temp=
myar[ptr];
                myar[ptr]=
myar[ptr+1];
                myar[ptr+1]=
temp;
```

```
            }
            ptr++;
        }
    }

    for(int i= 1; i<=n; i++)
        cout << myar[i] << " ";
    cout << endl;

    return 0;
}
```

Problem No. & Statement	*7. Write a program to search an element from a list of n numbers using Linear Search algorithm.*

```
#include<iostream>
using namespace std;

int main()
{
    int n, item;
    cin >> n >> item;
    int k= 1;
    int loc= 0;
    int myar[n+32];
    for(int i= 1; i<=n; i++)
        cin >> myar[i];

    while(loc==0 && k<=n)
    {
        if(myar[k]==item)
            loc= k;
        k++;
    }

    if(loc==0)
        cout << "Item is not in the given Array!" << endl;
    else
        cout << loc << " is the location of " << item << '.' << endl;
    return 0;
}
```

Problem No. & Statement	*8. Write a program to search an element from a list of n numbers using Binary Search algorithm.*

```
#include<bits/stdc++.h>
using namespace std;

int main()
{

    int n, item;
    cin >> n;
    int arr[n+32];
    for(int i= 1; i<=n; i++)
        cin >> arr[i];

    sort(arr+1, arr+n+1);

    cin >> item;
    int begin= 1, end= n, loc= 0;
    int mid= (begin+end)/2;

    while(begin<=end && arr[mid]!=item)
    {
        if(item<arr[mid])
            end= mid-1;
        else
            begin= mid+1;

        mid= (begin+end)/2;
    }




    if(arr[mid]==item)
    {
        loc= mid;
        cout << item << " is found at location " << loc << "!"<< endl;
    }
    else
        cout << item << " is not found in the array!";

    return 0;
}
```

Problem No. & Statement	*9. Write a program to determine whether a number n is prime or not where 1< n <2^{15} by using sieve method.*

```
#include<bits/stdc++.h>
using namespace std;
```

```
bool Myprime[10000032];

void isprime()
{
    memset(Myprime, true,
sizeof(Myprime));
    for(int i= 2; i*i<=10000032;
i++)
        if(Myprime[i])
            for(int j= i*i; j<=
10000032; j+= i)
                Myprime[j]=
false;
}


int main()
{
    isprime();

    int n;
    cin >> n;

    if(Myprime[n])
        cout << "Yes, " << n <<
" is a prime number!" << endl;
    else
        cout << "No, " << n << "
is not a prime number!" << endl;

    return 0;
}
```

Problem No. & Statement	*10. Write a program to write 100 randomly generated integer to a file called RAND.DAT. And then read the contents of the file and display them on the screen.*

```
#include<iostream>
#include<bits/stdc++.h>
#include<time.h>
using namespace std;
```

```
int main()
{
    //Writing on file
    int n= 100, val;

    FILE *ok=
fopen("RAND.DAT.txt", "w");

    srand(time(0));
    for(int i= 1; i<=100; i++)
    {
        val= rand()%132;
        fprintf(ok, "%d\n",
val);
    }

    fclose(ok);


    //Reading from file
    int store[132];
    FILE *ok1=
fopen("RAND.DAT.txt", "r");

    for(int i= 1; i<=100; i++)
    {
        fscanf(ok1, "%d",
&store[i]);

        if(i==100)
            cout << store[100]
<< '.'<< endl;
        else
            cout << store[i] <<
", ";
    }

    fclose(ok1);

    return 0;
}
```

For better view, Please, Click in the link:
https://paste.ubuntu.com/p/s5k7M24mzm/