DSA Assignment 1

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(2C35)

1.

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

const int MAX = 100;   // maximum array size
int a[MAX], len = 0;   // global array and length

// Display array
void display() {
    if (len == 0) {
        cout << "Array is empty.\n";
        return;
    }
    cout << "Array is --> ";
    for (int i = 0; i < len; i++) {
        cout << a[i] << " ";
    }
    cout << endl;
}

// Insert element at given position
void insertElement() {
    int pos, val;
    cout << "Enter position (0 to " << len << "): ";
    cin >> pos;
    if (pos < 0 || pos > len) {
        cout << "Invalid position!\n";
        return;
    }
    cout << "Enter value to insert: ";
    cin >> val;
    for (int i = len; i > pos; i--) {
        a[i] = a[i - 1];
    }
    a[pos] = val;
    len++;
    cout << "Insertion successful.\n";
    display();
}

// Delete element at given position
void deleteElement() {
    if (len == 0) {
        cout << "Array is empty. Nothing to delete.\n";
        return;
    }
    int pos;
    cout << "Enter position to delete (0 to " << len - 1 << "): ";
    cin >> pos;
    if (pos < 0 || pos >= len) {
        cout << "Invalid position!\n";
        return;
```

```
    }
    for (int i = pos; i < len - 1; i++) {
        a[i] = a[i + 1];
    }
    len--;
    cout << "Deletion successful.\n";
    display();
}

// Search element
void searchElement() {
    int val, found = 0;
    cout << "Enter value to search: ";
    cin >> val;
    for (int i = 0; i < len; i++) {
        if (a[i] == val) {
            cout << "Element found at index " << i << endl;
            found = 1;
            break;
        }
    }
    if (!found)
        cout << "Element not found.\n";
}

// Create array (initial fill)
void createArray() {
    cout << "Enter number of elements: ";
    cin >> len;
    if (len > MAX) {
        cout << "Exceeds maximum size " << MAX << endl;
        len = 0;
        return;
    }
    cout << "Enter elements: ";
    for (int i = 0; i < len; i++) {
        cin >> a[i];
    }
    cout << "Array created successfully.\n";
    display();
}

// Main menu
int main() {
    int choice;
    while (true) {
        cout << "\nMenu:\n";
        cout << "1. Create Array\n";
        cout << "2. Display Array\n";
        cout << "3. Insert Element\n";
        cout << "4. Delete Element\n";
        cout << "5. Search Element\n";
        cout << "6. Exit\n";
        cout << "Enter your choice: ";
        cin >> choice;

        switch (choice) {
            case 1: createArray(); break;
            case 2: display(); break;
            case 3: insertElement(); break;
```

```
            case 4: deleteElement(); break;
            case 5: searchElement(); break;
            case 6: cout << "Exiting...\n"; return 0;
            default: cout << "Invalid choice! Try again.\n";
        }
    }
}
```

OUTPUT

```
Menu:
1. Create Array
2. Display Array
3. Insert Element
4. Delete Element
5. Search Element
6. Exit
Enter your choice: 1
Enter number of elements: 5
Enter elements: 1 2 3 4 5
Array created successfully.
Array is --> 1 2 3 4 5

Menu:
1. Create Array
2. Display Array
3. Insert Element
4. Delete Element
5. Search Element
6. Exit
Enter your choice: 2
Array is --> 1 2 3 4 5

Menu:
1. Create Array
2. Display Array
3. Insert Element
4. Delete Element
5. Search Element
6. Exit
Enter your choice: 3
Enter position (0 to 5): 4
Enter value to insert: 3
Insertion successful.
Array is --> 1 2 3 4 3 5
```

```
Menu:
1. Create Array
2. Display Array
3. Insert Element
4. Delete Element
5. Search Element
6. Exit
Enter your choice: 4
Enter position to delete (0 to 5): 1
Deletion successful.
Array is --> 1 3 4 3 5

Menu:
1. Create Array
2. Display Array
3. Insert Element
4. Delete Element
5. Search Element
6. Exit
Enter your choice: 5
Enter value to search: 4
Element found at index 2

Menu:
1. Create Array
2. Display Array
3. Insert Element
4. Delete Element
5. Search Element
6. Exit
Enter your choice: 6
Exiting...
```

2.

```
// Remove duplicate elements in the array so that it prints unique elements

#include <iostream>
using namespace std;
int main(){
    int i,j,k,n;
    cout<<"Enter number of elements you want \n";
    cin>>n;
    int a[n];
    cout<<"Enter the elements in array\n";
    for(i=0;i<n;i++){
        cin>>a[i];
    }
    cout<<"Original Array\n";
    for(i=0;i<n;i++){
        cout<<a[i]<<' ';
    }
    for (i=0;i<n;i++){
```

```
        for(j=i+1;j<n;j++){
            if(a[i]==a[j]){
                for(k=i;k<n-1;k++){
                    a[k]=a[k+1];
                }
                j--;
                n--;
                i--;
            }
        }
    }
    cout<<"\nNew Array\n";
    for(i=0;i<n;i++){
        cout<<a[i]<<' ';
    }
}
```

OUTPUT

```
Enter number of elements you want
10
Enter the elements in array
1 3 2 4 2 3 4 45 1 5
Original Array
1 3 2 4 2 3 4 45 1 5
New Array
3 4 45 1 5 %
```

3.

Output of this code is 10000 because first element of the array is initialized with 1 and whole array is automatically initiallized with zero so when we print the values in array it prints 10000.

4 (a).

```
// Enter an array and reverse it

# include <iostream>
using namespace std;
int main(){
    int i,j,n;
    cout<<"Enter number of elements in array\n";
    cin>>n;
    int a[n];
    cout<<"Enter elements \n";
    for(i=0;i<n;i++){
        cin>>a[i];
    }
    cout<<"Original array is\n";
        for(i=0;i<n;i++){
        cout<<a[i]<<' ';
    }
    for(i=0;i<(n/2);i++){
        j=a[i];
        a[i]=a[n-i-1];
        a[n-i-1]=j;
    }
```

```
    cout<<"\nReversed array is\n";
    for(i=0;i<n;i++){
        cout<<a[i]<<' ';
    }
}
```

OUTPUT

```
Enter number of elements in array
5
Enter elements
1 2 3 4 5
Original array is
1 2 3 4 5
Reversed array is
5 4 3 2 1 %
```

(b)

```
// Write code for matrix multiplication

#include <iostream>
using namespace std;
int main(){
    int r1,c1,r2,c2,i,j,k;
    cout<<"Enter rows and columns of matrix 1\n";
    cin>>r1>>c1;
    cout<<"Enter rows and columns of matrix 2\n";
    cin>>r2>>c2;
    if (c1!=r2){
        cout<<"Matrix Multiplication is not possible";
    }
    else{
        int a[r1][c1],b[r2][c2],c[r1][c2];
        cout<<"Enter elements of matrix 1\n";
        for(i=0;i<r1;i++){
            for(j=0;j<c1;j++){
                cin>>a[i][j];
            }
        }
        cout<<"Enter elements of matrix 2\n";
        for(i=0;i<r2;i++){
            for(j=0;j<c2;j++){
                cin>>b[i][j];
            }
        }
        for(i=0;i<r1;i++){
            for(j=0;j<c2;j++){
                c[i][j]=0;
            }
        }
        for(i=0;i<r1;i++){
            for(j=0;j<c2;j++){
                for(k=0;k<r2;k++){
                    c[i][j]=c[i][j]+a[i][k]*b[k][j];
                }
                cout<<c[i][j]<<' ';
            }
```

```
            cout<<'\n';
        }
    }
}
```

OUTPUT

```
Enter rows and columns of matrix 1
3
3
Enter rows and columns of matrix 2
3
4
Enter elements of matrix 1
1 2 3 4 5 6 7 8 9
Enter elements of matrix 2
1 2 3 4 5 6 7 8 9 0 10 11
38 14 47 53
83 38 107 122
128 62 167 191
```

(c)

```
// Transpose of a matrix

#include <iostream>
using namespace std;
int main(){
    int r,c,i,j;
    cout<<"Enter rows and columns: ";
    cin>>r>>c;
    int a[r][c],b[c][r];
    cout<<"Enter elements in the array: ";
    for(i=0;i<r;i++){
        for(j=0;j<c;j++){
            cin>>a[i][j];
        }
    }
    for(i=0;i<c;i++){
        for(j=0;j<r;j++){
            b[i][j]=a[j][i];
        }
    }
    for(i=0;i<c;i++){
        for(j=0;j<r;j++){
            cout<<b[i][j]<<' ';
        }
        cout<<'\n';
    }
}
```

OUTPUT

```
Enter rows and columns: 3 3
Enter elements in the array: 1 2 3 4 5 6 7 8 9
1 4 7
2 5 8
3 6 9
```

5.

```
// Find sum of every row and column in 2d array

# include <iostream>
using namespace std;
int main(){
    int r,c,i,j,sumr=0,sumc=0;
    cout<<"Enter rows and columns you want in your array\n";
    cin>>r>>c;
    int a[r][c];
    cout<<"Start entering the elements \n";
    for(i=0;i<r;i++){
        for(j=0;j<c;j++){
            cin>>a[i][j];
        }
    }
    for(i=0;i<r;i++){
        cout<<"Sum of all the elements of row "<<i+1<<" is ";
        for(j=0;j<c;j++){
            sumr=sumr+a[i][j];
        }
        cout<<sumr<<"\n";
        sumr=0;
    }
    for(i=0;i<c;i++){
        cout<<"Sum of all the elements of column "<<i+1<<" is ";
        for(j=0;j<r;j++){
            sumc=sumc+a[j][i];
        }
        cout<<sumc<<"\n";
        sumc=0;
    }
}
```

OUTPUT

```
.
Enter rows and columns you want in your array
3
3
Start entering the elements
1 2 3 4 5 6 7 8 9
Sum of all the elements of row 1 is 6
Sum of all the elements of row 2 is 15
Sum of all the elements of row 3 is 24
Sum of all the elements of column 1 is 12
Sum of all the elements of column 2 is 15
Sum of all the elements of column 3 is 18
```