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Today

C++ Array and Algorithms

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1. Write a program to create an array of n elements and then display all the elements of the list.

2. Write a program to find the largest number from a given list of integers.

3. Write a program to calculate the roots of the quadratic equation  $ax^2 + bx + c = 0$  where a, b and c are known.

4. Write a program to create an array of n elements and then separately write the odd and even elements of the list.

5. Write a program to create an array of n elements and then insert an element to the list.

6. Write a program to create an array of n elements and then delete an element from the list.

7. Write a program to sort n numbers using Bubble Sort algorithm.

8. Write a program to search an element from a list of n numbers using Linear Search algorithm.

9. Write a program to search an element from a list of n numbers using Binary Search algorithm.

solve with c++ easy way

Here are solutions to the listed problems in C++ with easy-to-understand code and comments for clarity.

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1. Create and Display an Array of Elements

cppCopy code

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

int main() {
    int n;
    cout << "Enter number of elements: ";
    cin >> n;
    int arr[n];

    cout << "Enter elements of the array: " << endl;
    for (int i = 0; i < n; i++) {
        cin >> arr[i];
    }

    cout << "Elements of the array are: ";
    for (int i = 0; i < n; i++) {
        cout << arr[i] << " ";
    }
    return 0;
}
```

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2. Find the Largest Number in an Array

cppCopy code

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

int main() {
    int n;
    cout << "Enter number of elements: ";
    cin >> n;
    int arr[n];

    cout << "Enter elements of the array: " << endl;
    for (int i = 0; i < n; i++) {
        cin >> arr[i];
    }

    int largest = arr[0];
    for (int i = 1; i < n; i++) {
        if (arr[i] > largest) {
            largest = arr[i];
        }
    }

    cout << "The largest number is: " << largest << endl;
    return 0;
}
```

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3. Calculate the Roots of a Quadratic Equation

cpp

 Copy code

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

int main() {
    double a, b, c;
    cout << "Enter coefficients a, b, and c: ";
    cin >> a >> b >> c;

    double discriminant = b * b - 4 * a * c;

    if (discriminant > 0) {
        double root1 = (-b + sqrt(discriminant)) / (2 * a);
        double root2 = (-b - sqrt(discriminant)) / (2 * a);
        cout << "Roots are real and different." << endl;
        cout << "Root 1 = " << root1 << endl;
        cout << "Root 2 = " << root2 << endl;
    } else if (discriminant == 0) {
        double root = -b / (2 * a);
        cout << "Roots are real and the same." << endl;
        cout << "Root = " << root << endl;
    } else {
        cout << "Roots are complex and different." << endl;
        double realPart = -b / (2 * a);
        double imagPart = sqrt(-discriminant) / (2 * a);
        cout << "Root 1 = " << realPart << " + " << imagPart << "i" << endl;
        cout << "Root 2 = " << realPart << " - " << imagPart << "i" << endl;
    }

    return 0;
}
```

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#### 4. Separate Odd and Even Elements in an Array

cpp

 Copy code

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

int main() {
    int n;
    cout << "Enter number of elements: ";
    cin >> n;
    int arr[n];

    cout << "Enter elements of the array: " << endl;
    for (int i = 0; i < n; i++) {
        cin >> arr[i];
    }

    cout << "Odd elements: ";
    for (int i = 0; i < n; i++) {
        if (arr[i] % 2 != 0) {
            cout << arr[i] << " ";
        }
    }

    cout << "\nEven elements: ";
    for (int i = 0; i < n; i++) {
        if (arr[i] % 2 == 0) {
            cout << arr[i] << " ";
        }
    }

    return 0;
}
```

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#### 5. Insert an Element into an Array

cpp

 Copy code

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

int main() {
    int n, pos, elem;
    cout << "Enter number of elements: ";
    cin >> n;
    int arr[n+1];

    cout << "Enter elements of the array: " << endl;
    for (int i = 0; i < n; i++) {
```

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```

        cin >> arr[i];
    }

    cout << "Enter position to insert element (1-based index): ";
    cin >> pos;
    cout << "Enter element to insert: ";
    cin >> elem;

    for (int i = n; i >= pos; i--) {
        arr[i] = arr[i - 1];
    }
    arr[pos - 1] = elem;
    n++;

    cout << "Array after insertion: ";
    for (int i = 0; i < n; i++) {
        cout << arr[i] << " ";
    }
    return 0;
}

```

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## 6. Delete an Element from an Array

```

cpp
Copy code

#include <iostream>
using namespace std;

int main() {
    int n, pos;
    cout << "Enter number of elements: ";
    cin >> n;
    int arr[n];

    cout << "Enter elements of the array: " << endl;
    for (int i = 0; i < n; i++) {
        cin >> arr[i];
    }

    cout << "Enter position to delete element (1-based index): ";
    cin >> pos;

    for (int i = pos - 1; i < n - 1; i++) {
        arr[i] = arr[i + 1];
    }
    n--;

    cout << "Array after deletion: ";
    for (int i = 0; i < n; i++) {
        cout << arr[i] << " ";
    }
    return 0;
}

```

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## 7. Bubble Sort Algorithm

```

cpp
Copy code

#include <iostream>
using namespace std;

int main() {
    int n;
    cout << "Enter number of elements: ";
    cin >> n;
    int arr[n];

    cout << "Enter elements of the array: " << endl;
    for (int i = 0; i < n; i++) {
        cin >> arr[i];
    }

    for (int i = 0; i < n - 1; i++) {
        for (int j = 0; j < n - i - 1; j++) {
            if (arr[j] > arr[j + 1]) {
                swap(arr[j], arr[j + 1]);
            }
        }
    }

    cout << "Sorted array: ";
    for (int i = 0; i < n; i++) {
        cout << arr[i] << " ";
    }
}

```

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```
}  
return 0;  
}
```



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## 8. Linear Search Algorithm

cpp

Copy code

```
#include <iostream>  
using namespace std;  
  
int main() {  
    int n, key;  
    cout << "Enter number of elements: ";  
    cin >> n;  
    int arr[n];  
  
    cout << "Enter elements of the array: " << endl;  
    for (int i = 0; i < n; i++) {  
        cin >> arr[i];  
    }  
  
    cout << "Enter element to search: ";  
    cin >> key;  
  
    bool found = false;  
    for (int i = 0; i < n; i++) {  
        if (arr[i] == key) {  
            cout << "Element found at position: " << i + 1 << endl;  
            found = true;  
            break;  
        }  
    }  
  
    if (!found) {  
        cout << "Element not found." << endl;  
    }  
    return 0;  
}
```



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## 9. Binary Search Algorithm (Assuming Sorted Array)

cpp

Copy code

```
#include <iostream>  
using namespace std;  
  
int main() {  
    int n, key;  
    cout << "Enter number of elements: ";  
    cin >> n;  
    int arr[n];  
  
    cout << "Enter elements of the sorted array: " << endl;  
    for (int i = 0; i < n; i++) {  
        cin >> arr[i];  
    }  
  
    cout << "Enter element to search: ";  
    cin >> key;  
  
    int low = 0, high = n - 1;  
    bool found = false;  
  
    while (low <= high) {  
        int mid = low + (high - low) / 2;  
  
        if (arr[mid] == key) {  
            cout << "Element found at position: " << mid + 1 << endl;  
            found = true;  
            break;  
        } else if (arr[mid] < key) {  
            low = mid + 1;  
        } else {  
            high = mid - 1;  
        }  
    }  
  
    if (!found) {  
        cout << "Element not found." << endl;  
    }  
    return 0;  
}
```




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These programs cover the tasks requested in an easy-to-understand way using basic C++ operations and control structures.

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🔍 Infinite recursion explanation

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