
1- Trace the following program and predict the output.

```cpp
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    int arr[5] = {1, 2, 3, 4, 5};
    int temp;

    for (int i = 0; i < 5; i += 2) {
        temp = arr[i];
        arr[i] = arr[i + 1];
        arr[i + 1] = temp;
    }

    for (int i = 0; i < 4; i++) {
        cout << arr[i] << " ";
    }

    return 0;
}
```

Solution

```
2 1 4 3
```

2- Trace the following program and predict the output.

```cpp
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    int arr[4] = {10, 20, 30, 40};
    int sum = 0;

    for (int i = 0; i < 4; i+=2) {
        sum += arr[i];
    }

    cout << "Sum: " << sum;

    return 0;
}
```

Solution

```
Sum: 40
```

3- Trace the following program and predict the output.

```cpp
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    int arr[6] = {2, 4, 6, 8, 10, 12};

    for (int i = 0; i < 6; i++) {
        arr[++i] *= 2;
    }

    for (int i = 0; i < 6; i++) {
        cout << arr[i] << " ";
    }

    return 0;
}
```

Solution

```
2 8 6 16 10 24
```

4-Trace the following program and predict the output.

```cpp
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    int arr[5] = {1, 2, 3, 4, 5};
    int temp;

    for (int i = 0; i < 5 / 2; i++) {
        temp = arr[i];
        arr[i] = arr[4 - i];
        arr[4 - i] = temp;
    }

    for (int i = 0; i < 5; i++) {
        cout << arr[i] << " ";
    }

    return 0;
}
```

Solution

```
5 4 3 2 1
```

5- Trace the following program and predict the output.

```cpp
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    int arr[7] = {12, 45, 78, 23, 56, 89, 34};
    int num = arr[0];

    for (int i = 1; i < 7; i++) {
        if (arr[i] > num) {
            num = arr[i];
        }
    }

    cout << "num: " << num;

    return 0;
}
```

Solution

```
num: 89
```

6- Trace the following program and predict the output.

```cpp
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    int arr[6] = {20, 35, 10, 45, 30, 15};
    int target = 45;
    int index = -1;

    for (int i = 0; i < 6; i++) {
        if (arr[i] == target) {
            index = i;
            break;
        }
    }

    cout << "num:  " << target << " index: " << index;

    return 0;
}
```

Solution

```
num:  45 index: 3
```

7- Trace the following program and predict the output.

```cpp
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    int arr1[4] = {2, 4, 6, 8};
    int arr2[4] = {1, 3, 5, 7};
    int result[4];

    for (int i = 0; i < 4; i++) {
        result[i] = arr1[i] * arr2[i];
    }

    for (int i = 0; i < 4; i++) {
        cout << result[i] << " ";
    }

    return 0;
}
```

Solution

```
2 12 30 56
```

8- Trace the following program and predict the output.

```cpp
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    int arr[5] = {15, 20, 25, 30, 35};
    double sum = 0;

    for (int i = 0; i < 5; i++) {
        sum += arr[i++];
    }

    double average = sum / 5;

    cout << "Average: " << average;

    return 0;
}
```

Solution

```
Average: 15
```

9- Trace the following program and predict the output.

```cpp
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    int arr[6] = {1, 2, 3, 4, 5, 6};
    int temp = arr[5];

    for (int i = 5; i > 0; i--) {
        arr[i] = arr[i - 1];
    }

    arr[0] = temp;

    for (int i = 0; i < 6; i++) {
        cout << arr[i] << " ";
    }

    return 0;
}
```

Solution

```
6 1 2 3 4 5
```

10- Trace the following program and predict the output.

```cpp
// www.gammal.tech

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

int main() {
    int arr[7] = {12, 45, 23, 56, 78, 34, 89};
    int smallest = INT_MAX, secondSmallest = INT_MAX;

    for (int i = 0; i < 7; i++) {
        if (arr[i] < smallest) {
            secondSmallest = smallest;
            smallest = arr[i];
        } else if (arr[i] < secondSmallest && arr[i] != smallest) {
            secondSmallest = arr[i];
        }
    }

    cout << "num: " << secondSmallest;

    return 0;
}
```

Solution

```
num: 23
```