

# c programming questions with solutions

**C programming questions with solutions** are essential for anyone looking to strengthen their understanding of the C programming language. C is one of the most widely used programming languages, known for its efficiency and versatility. Whether you are preparing for interviews, exams, or simply improving your coding skills, practicing C programming questions can be incredibly beneficial. This article will explore various categories of C programming questions, provide detailed solutions, and offer insights into best practices.

## Types of C Programming Questions

C programming questions can be categorized into several types based on their complexity and the concepts they cover. Below are some common categories:

### 1. Basic Syntax and Data Types

These questions focus on the fundamental aspects of C, including syntax, data types, and operators.

### 2. Control Structures

Control structures include conditional statements (if, switch) and loops (for, while, do-while). Questions in this category assess your understanding of flow control in C.

### 3. Functions and Recursion

These questions test your ability to create and use functions, including recursive functions.

### 4. Arrays and Strings

This section covers questions related to manipulating arrays and strings, which are crucial data structures in C.

### 5. Pointers and Dynamic Memory Allocation

Pointers are a powerful feature of C. Questions may involve pointer arithmetic, pointer to functions, and dynamic memory allocation using malloc and free.

## 6. Structures and Unions

These questions assess your understanding of user-defined data types in C.

## 7. File Handling

This category includes questions related to reading from and writing to files.

## 8. Algorithms and Data Structures

Questions in this section may involve implementing common algorithms and data structures like sorting, searching, linked lists, and trees.

## Sample Questions and Solutions

Now, let's delve into some sample C programming questions along with their solutions.

### 1. Basic Syntax and Data Types

Question: Write a C program to find the sum of two integers.

Solution:

```
```c
include

int main() {
int a, b, sum;

printf("Enter two integers: ");
scanf("%d %d", &a, &b);

sum = a + b;

printf("Sum = %d\n", sum);
return 0;
}
```
```

Explanation:

- The program begins by including the standard input-output library.
- It declares three integer variables: `a`, `b`, and `sum`.
- The user is prompted to enter two integers, which are read using `scanf`.
- The sum is calculated and printed.

## 2. Control Structures

Question: Write a C program that checks whether a number is even or odd.

Solution:

```
```c
include

int main() {
int number;

printf("Enter an integer: ");
scanf("%d", &number);

if (number % 2 == 0) {
printf("%d is even.\n", number);
} else {
printf("%d is odd.\n", number);
}

return 0;
}
```
```

Explanation:

- This program takes an integer input from the user.
- It uses the modulus operator to determine if the number is even or odd, printing the appropriate message.

## 3. Functions and Recursion

Question: Write a recursive function to calculate the factorial of a number.

Solution:

```
```c
include

int factorial(int n) {
if (n == 0)
return 1;
else
return n factorial(n - 1);
}

int main() {
int num;

printf("Enter a positive integer: ");
```

```
scanf("%d", &num);

printf("Factorial of %d = %d\n", num, factorial(num));
return 0;
}
...
```

Explanation:

- The `factorial` function calls itself recursively until it reaches the base case (`n == 0`).
- The `main` function handles user input and displays the result.

## 4. Arrays and Strings

Question: Write a C program to reverse a string.

Solution:

```
```c
include
include

int main() {
char str[100], reversed[100];
int len, i, j = 0;

printf("Enter a string: ");
fgets(str, sizeof(str), stdin);

len = strlen(str);

for (i = len - 1; i >= 0; i--) {
reversed[j++] = str[i];
}
reversed[j] = '\0'; // Null-terminate the reversed string

printf("Reversed string: %s\n", reversed);
return 0;
}
...

```

Explanation:

- This program uses `fgets` to read a string, which allows spaces.
- The string is reversed using a loop, and the reversed string is printed.

## 5. Pointers and Dynamic Memory Allocation

Question: Write a C program that dynamically allocates memory for an array

and calculates the average.

Solution:

```
```c
include
include

int main() {
int n, i;
float sum = 0.0, average;

printf("Enter the number of elements: ");
scanf("%d", &n);

float arr = (float)malloc(n sizeof(float));

if (arr == NULL) {
printf("Memory allocation failed!\n");
return 1;
}

printf("Enter %d elements:\n", n);
for (i = 0; i < n; i++) {
scanf("%f", &arr[i]);
sum += arr[i];
}

average = sum / n;
printf("Average = %.2f\n", average);

free(arr); // Free allocated memory
return 0;
}
```
```

Explanation:

- The program allocates memory for an array of floats based on user input.
- It calculates the sum and average, then frees the allocated memory.

## 6. Structures and Unions

Question: Create a structure to store student information and print it.

Solution:

```
```c
include

struct Student {
char name[50];
```

```

int age;
float grade;
};

int main() {
    struct Student student;

    printf("Enter student name: ");
    fgets(student.name, sizeof(student.name), stdin);
    printf("Enter age: ");
    scanf("%d", &student.age);
    printf("Enter grade: ");
    scanf("%f", &student.grade);

    printf("\nStudent Information:\n");
    printf("Name: %s", student.name);
    printf("Age: %d\n", student.age);
    printf("Grade: %.2f\n", student.grade);

    return 0;
}

```

Explanation:

- A `Student` structure is defined with fields for name, age, and grade.
- The program collects and displays the data.

## 7. File Handling

Question: Write a C program to read from a file and display its content.

Solution:

```

```c
include

int main() {
    FILE file;
    char ch;

    file = fopen("example.txt", "r");
    if (file == NULL) {
        printf("Could not open file.\n");
        return 1;
    }

    while ((ch = fgetc(file)) != EOF) {
        putchar(ch);
    }
}

```

```

fclose(file);
return 0;
}
...

```

Explanation:

- The program opens a file for reading, checks if it was opened successfully, and reads the content character by character until EOF.

## 8. Algorithms and Data Structures

Question: Implement a bubble sort algorithm.

Solution:

```

```c
include

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

int main() {
int arr[] = {64, 34, 25, 12, 22, 11, 90};
int n = sizeof(arr) / sizeof(arr[0]);

bubbleSort(arr, n);

printf("Sorted array: \n");
for (int i = 0; i < n; i++)
printf("%d ", arr[i]);

return 0;
}
...

```

Explanation:

- The `bubbleSort` function sorts the array in ascending order using the bubble sort algorithm.
- The `main` function initializes an array and calls the sorting function.

# Conclusion

In conclusion, practicing C programming questions with solutions is an excellent way to enhance your programming skills. The examples provided in this article cover a range of topics from basic

## Frequently Asked Questions

### What is the difference between '==' and '===' in C?

'==' is used for equality comparison of values, while '===' is not a valid operator in C. C does not have a strict equality operator like JavaScript.

### How can I dynamically allocate memory in C?

You can use functions like `malloc()`, `calloc()`, or `realloc()` from the `stdlib.h` library to dynamically allocate memory. For example: `int arr = (int *)malloc(n * sizeof(int));` allocates memory for an array of `n` integers.

### What is a segmentation fault in C?

A segmentation fault occurs when a program tries to access a memory location that it's not allowed to access. This often happens due to dereferencing a null or uninitialized pointer.

### How do I swap two numbers without using a third variable in C?

You can swap two numbers using arithmetic operations: `a = a + b; b = a - b; a = a - b;` or by using bitwise XOR: `a = a ^ b; b = a ^ b; a = a ^ b;`.

### What is the purpose of the 'static' keyword in C?

The 'static' keyword limits the visibility of a variable or function to the file in which it is declared, and for variables, it retains their value between function calls.

### How do I read and write to a file in C?

You can use `'fopen()'` to open a file, `'fprintf()'` or `'fwrite()'` to write to it, `'fscanf()'` or `'fread()'` to read from it, and `'fclose()'` to close the file. Example: `FILE fp = fopen("file.txt", "r");`.



## What is a pointer and how is it used in C?

A pointer is a variable that stores the address of another variable. It is used for dynamic memory allocation, arrays, and to pass variables by reference. Example: `'int ptr = &var;'` assigns the address of 'var' to 'ptr'.

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