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Here are some common categories of functions:

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Functions in C can be categorized into several types based on their characteristics and purpose.

Here Are Some Common Categories Of Functions:

1. Standard Library Functions:

- These are functions provided by the C standard library, such as `<stdio.h>`, `<stdlib.h>`, `<string.h>` etc.
- Standard library functions serve various purposes, including input/output operations, memory management, string manipulation, mathematical calculations, and more.
- Examples: `printf()`, `scanf()`, `malloc()`, `strlen()`, `strcmp()`, etc.

2. User-Defined Functions:

- User-defined functions are created by the programmer to perform specific tasks within

a program.

- These functions provide modularity, code reusability, and abstraction, making the program easier to understand and maintain.
 - Examples: Functions that perform calculations, validate input, process data, implement algorithms, etc.
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3. Recursive Functions:

- Recursive functions are functions that call themselves directly or indirectly.
- They are useful for solving problems that can be divided into smaller sub-problems of the same type.
- Recursive functions have a base case that defines the termination condition, and a recursive case that calls the function with a smaller input.
- Examples: Calculating factorials, computing Fibonacci series, traversing data structures recursively, etc.
- Example of recursive functions:



```
#include <stdio.h>

int sum(int n) {
    // Base case: if n is 1, return 1
    if (n == 1) {
        return 1;
    }
}
```

```
// Recursive case: add n to the sum of numbers from 1 to (n-1)
return n + sum(n - 1);
}

int main() {
    int num = 5;
    int result = sum(num);
    printf("The sum of numbers from 1 to %d is: %d\n", num, result);
    return 0;
}
```

4. Library Functions:

- Library functions are functions grouped together in a library for specific purposes.
- Libraries contain related functions that can be reused across multiple programs.
- These functions provide additional functionality beyond what is available in the standard library.
- Examples: Math library functions (), time-related functions (), graphics functions (), etc.

5. Callback Functions:

- Callback functions are functions that are passed as arguments to other functions.
- The receiving function can call the callback function at a specific point, allowing for customization and extensibility.

- Callback functions are commonly used in event-driven programming or when implementing data structures like sorting algorithms.
 - Examples: Event handlers, comparison functions for sorting, callback functions in APIs, etc.
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6. Inline Functions:

- Inline functions are small functions that are expanded at the call site instead of being called like regular functions.
- The purpose of inline functions is to avoid the overhead of function calls and improve performance.
- Inline functions are defined using the inline keyword.
- Examples: Small utility functions, simple arithmetic operations, etc.
- Example of inline function:



```
#include <stdio.h>

// Inline function to calculate the square of a number
inline int square(int num) {
    return num * num;
}

int main() {
    int num = 5;
    int result = square(num);
```

```
printf("The square of %d is: %d\n", num, result);  
return 0;  
}
```

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