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C Programming

Question 1: What is the purpose of the main() function in a C program? Explain its significance.

Answer: In a C program, a program begins at the main() function and this is the start of the program. Each C program should be associated with exactly one main() function because this is where the operating system starts with its execution of instructions. It is also an organizer of the flow of the programs as well by calling other functions, functioning input and output both. The value returned by main() (often an integer) is the status in which the operating system should terminate the program. In general, main() is necessary to start the program, as well as to be able to tie everything together.

Question 2: Explain the difference between a variable declaration and a variable initialization in C.

Answer: In C, a variable declaration tells the compiler about the variable's name and type but does not assign it a value. For example: `int x;` declares a variable x of type int.

Variable initialization, on the other hand, assigns an initial value to the variable at the time of declaration. For example: `int x = 10;` declares the variable x and sets its value to 10.

Question 4: What are the different data types available in C? Provide examples of each data type.

Answer: In C, data types specify the type of data a variable can hold. The main data types are:

1. Integer types – store whole numbers.
 - Examples: `int a = 10;`, `short b = 5`, `long c = 100000;`
2. Floating-point types – store decimal numbers.
 - Examples: `float x = 3.14`, `double y = 3.141592;`
3. Character type – store a single character.
 - Example: `char ch = 'A';`

Question 5: Explain the concept of type conversions in C. Provide examples of implicit and explicit type conversions.

Answer: In C, type conversion is the process of converting a variable from one data type to another. This is important when performing operations involving different data types to ensure correct results.

1. Implicit Type Conversion (Type Casting)

- It is done automatically by the compiler.
- The compiler converts a smaller or compatible type to a larger or compatible type to prevent data loss.

Example:

```
int a = 10;
```

```
float b = 3.5;
```

```
float result = a + b; // 'a' is implicitly converted to float
```

2. Explicit Type Conversion (Type Casting)

- Done manually by the programmer using a cast operator.

Example:

```
float x = 7.8;
```

```
int y = (int)x; // 'x' is explicitly converted to int, fractional part is lost
```

Question 7: What is the role of the scanf() function in C? Provide an example of its usage.

Answer: The scanf() function in C is used to take input from the user during program execution. It reads data from standard input and stores it into variables according to the specified format specifier.

Example:

```
#include <stdio.h>
```

```
int main() {
```

```
    int age;
```

```
    printf("Enter your age: ");
```

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

```
    printf("You entered: %d\n", age);
```

```
    return 0;
```

```
}
```

