Summary of Pointer-Based C Programming Problems

1. Purpose of Double Pointers

Double pointers (int **ptr) are used to:

- Access and modify the value of a pointer inside a function, such as changing the pointer to point to a new memory location.
- Handle dynamic 2D arrays or arrays of strings.
- Return multiple values from a function by modifying multiple memory addresses.

In Problem 5, double pointers could be used if the function needed to allocate memory for the result array and return it to the caller.

2. Relation Between Pointers, Arrays, and Strings

- An array name acts as a pointer to its first element. For example, arr[i] is equivalent to *(arr + i).
- A string is essentially a character array and can be traversed using a character pointer (char *).
- Arrays and strings can be passed to functions as pointers, allowing direct access and modification of their contents.

Problems 2 and 3 demonstrated how to manipulate strings and arrays using pointer arithmetic such as *ptr and ptr++.

3. Purpose of Pointer to Function

A pointer to a function allows the program to choose and execute a specific function at runtime dynamically. This is useful for implementing features like menus, callbacks, and calculators.

In Problem 6, a function pointer was used to select and perform the appropriate arithmetic operation based on the user's choice using a switch-case structure.