1. **Understanding Recursion/Towers of Hanoi**

   Let’s look at a classic recursive problem called the **Towers of Hanoi**. This is a game where you have 3 posts/columns and \( n \) disks of different sizes, which are initially arranged in ascending order on the 1\(^{st} \) post/column. Your goal is to get the disks arranged on the 2\(^{nd} \) post/column in ascending order using these following rules:
   
   - You can only move one disk at a time.
   - You cannot put a larger disk on top of a smaller disk.

   First, begin by writing the steps on a piece of paper that represents the moves among the posts. For instance, with three disks, the smallest disk from the 1\(^{st} \) post will be moved to the second post, i.e. \( 1 \rightarrow 2 \). Then, the 2\(^{nd} \) disk will be moved to the 3\(^{rd} \) post, i.e. \( 1 \rightarrow 3 \), etc.

   Write the steps for the base case, \( n = 1 \) disks, \( n = 2 \) disks, and \( n = 3 \) disks. You should notice that you have \( 2^n - 1 \) moves for each of these cases. Also, note any pattern that you see, i.e. when do you see the base case.

   Here is an outline of the recursive towers function:

   ```c
   void towers(int number_of_disks, int from_post, int to_post, int spare_post) {
     if (number of disks is >= 1) {
       Call Towers with (number_of_disks-1, from_post, spare_post, to_post)
       Move the disk
       Call Towers with (number_of_disks-1, spare_post, to_post, from_post)
     }
   }
   ```

   As a group with the TAs, walk through the algorithm provided for the towers() function with a board that has 1 disk and 3 posts, then 2 disks and 3 posts, and 3 disks with 3 posts, e.g. . towers(1, 1, 2, 3);, towers(2, 1, 2, 3);, towers(3, 1, 2, 3);, etc.

   Provide the example walk through for the following calls:
   
   ```c
   towers(1, 1, 2, 3);
   towers(2, 1, 2, 3);
   towers(3, 1, 2, 3);
   ```

2. What is the heap vs. stack? What is a memory leak? How can we avoid them?

3. What is an array? How do you access elements in an array? What is the difference in a static vs. dynamic array? What is a C-style string?