Practice Questions - Recursion

1. Write a function that returns the sum of the digits of an integer.
    - int sumOfDigits(int x);
      If x is 234, the function should return 2 + 3 + 4, that is, 9.
      If x is 12, the function should return 1 + 2, which is 3.
      If x is 39, the function should return 12.
      If x is negative, ignore the minus sign. For example, -12 and 12 both return 3.

2. Write a recursive function that prints all the elements of an array of integers, one per line.
3. Same problem as the last one, but print out the elements in reverse order.
4. Find the sum of the integers from 1 through n. Use recursion.
5. Find the product of the integers from 1 through n (this is called the factorial function). If n is zero, return 1. Use recursion.
6. Count the number of zeros in an array of integers. Use recursion.
7. Find the minimum element in an array of integers. Use recursion.
8. Write a function for mutliply(a, b), where a and b are both positive integers, but you can only use the + or − operators.
9. Find Greatest Common Divisor (GCD) of 2 numbers using recursion.
10. Write a recursive function to reverse a string. Write a recursive function to reverse the words in a string, i.e., ”cat is running” becomes ”running is cat”.
11. A word is considered elfish if it contains the letters: e, l, and f in it, in any order. For example, we would say that the following words are elfish: whiteleaf, tasteful, unfriendly, and waffles, because they each contain those letters. Write a function that, given a word, tells us if that word is elfish or not. **Hard** version: Write another function x-ish, that, given two words, returns true if all the letters of the first word are contained in the second.
12. Alice and Bob are playing a game using a bunch of coins. The players pick several coins out of the bunch in turn. Each time a player is allowed to pick 1, 2 or 4 coins, and the player that gets the last coin is the winner. Assume that both players are very smart and he/she will try his/her best to work out a strategy to win the game. For example, if there are 2 coins and Alice is the first player to pick, she will definitely pick 2 coins and win. If there are 3 coins and Alice is still the first player to pick, no matter she picks 1 or 2 coins, Bob will get the last coin and win the game. Given the number of coins and the order of players (which means the first and the second players to pick the coins), you are required to write a program to calculate the winner of the game, and calculate how many different strategies there are for he/she to win the game. You can assume that there are no more than 30 coins.
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