CSCI 170 Discussion 6

According to Wikipedia, a **Recursion** is defined by two properties:

- A simple *base case* (or cases) — a terminating scenario that does not use recursion to produce an answer
- A *recursive step* — a set of rules that reduces all successive cases toward the base case.

Recursion Discussion

Problem 1: Give a recursive definition

Give a recursive definition of $f(n) = n! \times 2^n, n \geq 0$.

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Give a recursive definition of $f(n) = n! \times 2^n$.

$$f(n) = \begin{cases} 1 & \text{if } n = 0 \\ n \times f(n-1) \times 2 & \text{if } n > 0 \end{cases}$$

Recursion Discussion

Problem 2: Mutation of Recursion

Write a recurrence relation and base cases/initial conditions for the number of n-bit binary strings that DO NOT contain consecutive 1's.

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Solution:

If we start with a 0, then we accept any string of length $n-1$. If we start with a 1, then we must follow it with a 0, and then we accept any string of length $n-2$.

Write a recurrence relation and base cases/initial conditions for n-bit binary strings that DO NOT contain consecutive 1's.

Let $f(n)$ be the number of n-bit binary strings that do not contain consecutive 1's. We can define the recurrence relation as follows:

$$f(n) = f(n-1) + f(n-2)$$

The base cases are:

$$f(1) = 2, \quad f(2) = 3$$

Thank You

The End

Questions?