Quiz $2\frac{1}{2}$ for CSI35

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Directions: This quiz is due Thursday October 2, at 2:00 PM.

1. Recall that a *bit string* is a word on the alphabet $\{0, 1\}$. Let I be the function that counts the number of ones in a bit string s.
   (a) Give a recursive definition of $I(s)$.
   (b) Use structural induction to prove that for two string bits s and t we have:

   $$I(st) = I(s) + I(t)$$

   where, st stands for the concatenation of the two strings s and t.
   (c) Let $O(s)$ be the function that counts the number of zeros in s (this was defined in the previous homework), and let $l(s)$ be the length of s. Prove that:

   $$l(s) = O(s) + I(s)$$

   for all bitstrings s.