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CS-225 Discrete Structures in CS

Homework 6

1. Use iteration to guess an explicit formula for the sequence - ek = 3ek-1+ 2, for all integers k ≥ 2 , where e1 = 3  (using the formulas from summation\_formula\_updated.pdf to simplify your answers whenever possible).      (tower of Hanoi example?)
2. Use mathematical induction to verify the correctness of the formula you obtained in the above problem.
   * Basis Step:
     1. We are given
   * Inductive hypothesis:
   * Inductive step:
     1. , as was to be shown
3. Use iteration to guess an explicit formula for the sequence -  tk= tk−1 + 3k + 1,  for all integers k ≥ 1, where  t0 = 0  (using the formulas from summation\_formula\_updated.pdf to simplify your answers whenever possible).
   * Given: , for all integers k≥ 1
   * Given:
4. Give a recursive deﬁnition of the set of all integers (both negative and positive) that are multiples of 3.
   * .
5. Give a recursive deﬁnition for the set of all strings of a’s and b’s where all the strings are of odd lengths. ( Assume, S is set of all strings of a’s and b’s where all the strings are of odd lengths. Then S = { a, b, a**a**a, a**b**a, a**a**b, a**b**b, b**a**a, b**b**a, b**a**b, b**b**b, a**aaa**a, ...  ).
   * Base: a)
   * Recursion:

     2. All string in S have an odd amount of characters.
     3. By our recursion the aforementioned strings are ∈ S