

## HOMWORK ASSIGNMENT NO. 6

DATE: DECEMBER 1, 2009 DUE: JANUARY 5, 2009

- (1) Say that you have a sequence that starts with the index 0 and that  $a_0 = 1$  and  $a_1 = 1$  and that the  $n^{\text{th}}$  term in the sequence is  $a_n = 3a_{n-1} - 2a_{n-2}$ . Compute the first 7 terms in the sequence and guess what the formula is for  $a_n$ . This is just a conjecture. Now prove it by induction.
- (2) Recall that we did in class an explanation why

$$1^2 + 2^2 + 3^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

using collapsing sums. We also proved this in class using the principle of mathematical induction. Justify the following identity using both telescoping sums and induction.

$$1^3 + 2^3 + 3^3 + \cdots + n^3 = \frac{n^2(n+1)^2}{4}$$