Combinatorics. Quiz 7. Name _____ Time_____

Show all work for full or partial credit. Put a box around your final answer in each part. Try the problem on your own efore helping each other understand it.

1. a) Find the terms a_n of the sequence using the recursion, for $n = 0...5$:

$$a_{n+2} = 3a_n + 1 + n^2 - n, \quad n \geq 0; \quad a_0 = 1; \quad a_1 = 3.$$

b) Find the o.g.f for the sequence a_n. Check that the derivatives of the o.g.f. give the expected answer for $n = 0$ through $n = 5$.(Use a computer, turn in screen-shot: in wolfram you can use "Series[f(x)]".)

2. a) Given that the o.g.f for a sequence a_n is: $f(x) = \dfrac{2}{1-x^2} + \dfrac{5}{(1-x)^3} + x^2 + 1$, find the closed formula for a_n.

b) Find the terms of the sequence, using your formula for $n = 0...4$. Check your answer by comparing using your formula vs. using derivatives.(Use a computer, turn in screen-shot: in wolfram you can use "Series[f(x)]".)