Exercise 1 (Exercise 3)**.** Let c_n be the number of sequences of length n in which:

- ◇ Each number is one of $0, 1, 2, 3$.
- ◇ No two 3's are consecutive.

For instance 0221030132 is a valid sequence but 033112333 is not.

i) Find a recursion for c_n (this should be similar to the Fibonacci recurrence). Remember to include the initial conditions!
ii) Use the recursion to find a closed form for the generating function of c_n.
iii) Use the formula discussed in class for solving linear recurrences to find an explicit formula for c_n in terms of n.

Answer