(1) In class, we considered the problem of counting the bit strings of length n that do not contain two consecutive 0's. We wrote z_n for the number of such bit strings that end in 0, o_n for the number that end in 1, and a_n for the total number.

  (a) What is the relationship among a_n, z_n, and o_n? Explain. (Pay attention to subscripts!)

  (b) What is the relationship between o_n and a_{n-1}? Explain. (Pay attention to subscripts!)

  (c) Why did we choose to relate o_n, instead of z_n, to a_{n-1}?

  (d) We found the equation

$$a_n = z_{n-1} + 2o_{n-1}, \quad a_1 = 2, \ z_1 = 1, \ o_1 = 1.$$

  Explain this equation in words that could be understood by a non-mathematician.

  (e) Use your answers to (a) and (b), and the equation in (d), to write down a recurrence relation involving only a's. Be sure to include the initial condition.

• **Four** book problems: #8.1.3, 4, 7, 11. ~~For #8.1.7, you will probably also want to count the number of strings *not* satisfying the condition. See Example 8.1.4.~~