

Math 55 Quiz 12
November 16, 2016

This quiz will be graded out of 15 points; the True/False question is worth 3 points, and the exercise is worth 12 points. Please read the instructions carefully, and explain your work.

True or False. Mark the following statements as either true or false, or leave a blank if you don't know. A correct answer is worth +1 point, a blank is worth 0 points, and an incorrect answer is worth -1 points, so be smart about guessing!

- a. I The general form of solutions to an *inhomogeneous* linear recurrence relation with constant coefficients is the sum of a particular solution to the recurrence and the general solution of the associated homogeneous recurrence.
- b. T Dynamic programming gives an efficient algorithm for computing the Catalan numbers from their defining recurrence relation.
- c. F A linear recurrence is called homogeneous if its initial conditions are all zero.
X



Exercise. Find the general form of a solution to the recurrence relation $a_n = 4a_{n-1} - 4a_{n-2}$.

This can be determined using the characteristic equation of the recurrence:

$$x^2 - 4x + 4 = 0$$

This equation has a single root $x=2$ which has multiplicity two. Thus the general form of a solution is given by

$$a_n = (An + B) \cdot 2^n$$

where A and B are arbitrary constants.