

MAT 146, Spring 2019 Homework Assignment 3

Due before the start of the class on Monday, April 29

Please read Sections 2.1-2.3 of the textbook before starting on the problem set.

Written Assignment:

A. (a) Use Taylor formula to find the coefficients in the series $A(x) = \sqrt{1-x}$.
(b) We proved in class that the generating function for Catalan numbers has the form:

$$C(x) = \sum_{n=0}^{\infty} c_n x^n = \frac{1 - \sqrt{1-4x}}{2x}.$$

Use the result of part (a) to get an explicit formula for c_n .

B. (a) Find the generation function $\sum_{n=1}^{\infty} \frac{x^n}{n}$.
(b) The harmonic numbers H_n are defined as

$$H_n = 1 + \frac{1}{2} + \dots + \frac{1}{n}.$$

Find the generating function $\sum H_n x^n$.

C. Use generating functions to prove the identity

$$F_0 + \dots + F_n = F_{n+2} - 1$$

where F_k are Fibonacci numbers.

The homework must be legible, and written in connected sentences that explains what you are doing. Just the answer (whether correct or not) is not enough. Please put your name and section number on every page and staple the pages together. Homework should be handed in on time, late homework will not be graded.