

MAT 146, Spring 2019

Homework Assignment 2

Due before the start of the class on Monday, April 15

Please read Sections 1.1 and 1.2 of the textbook before starting on the problem set.

Written Assignment:

- A.** (a) Find a closed formula for the generating function $\sum_{k=0}^{\infty} k^3 z^k$.
(b) Use the result of (a) to find a closed formula for the sum of cubes:

$$P_3(N) = 1^3 + \dots + N^3.$$

Section 1.7: 11. Let $f(n)$ be the number of subsets of $\{1, \dots, n\}$ that contain no consecutive numbers. Find the recurrence that is satisfied by $f(n)$ and then “find” the numbers themselves.

12. Let $f(n, k)$ be the number of k -element subsets of $\{1, \dots, n\}$ that contain no consecutive numbers. Find the recurrence for $f(n, k)$, solve it and find the formula for $f(n, k)$. Show the numerical values of $f(n, k)$ in a Pascal triangle arrangement for $n \leq 6$.

13. By comparing the results of the above two exercises, deduce an identity. Draw a picture of the elements of Pascal triangle that are involved in this identity.

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.