

MATH 636, Fall 2015

HOMEWORK 12

To be prepared for presentation on Thursday, November 12.

Background reading: Combinatorics: A Guided Tour, Section 4.1 plus additional material.

Only consult with your classmates or professor to discuss the problem set.

We will discuss solutions to these questions in class.

- 12-1.** (a) Determine the generating function for the number of partitions of n such that there are at most two parts of the same size.
[For example, 511 is OK, but 4111 is not allowed since 1 appears thrice.]
- (b) Determine the generating function for the number of partitions of n such that the parts are all of size equal to a power of two.
[For example: 84422 is OK, but 744221 is not because 7 is not a power of two.]
- 12-2.** Recall that a **Dyck path of length** n is a lattice path from $(0, 0)$ to (n, n) that stays above the line $y = x$.)
- (a) Find and list the 14 Dyck paths of length 4 and the 14 multiplication schemes for 5 variables.
- (b) Use the Catalan bijections from class to determine which Dyck path corresponds to which multiplication scheme.