

MATH 636, Fall 2015

HOMEWORK 11

To be prepared for presentation on Tuesday, November 10.

*Background reading:* *Combinatorics: A Guided Tour*, Sections 2.4, 3.4, and 4.4, along with course notes on compositions of generating functions.

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

We will discuss solutions to these questions in class.

- 11-1.** How many ways are there to take a line of  $n$  soldiers, break them into non-empty platoons, and choose some (possibly empty) subset of each platoon to be on “night watch”? Give an exact answer, not simply a generating function.
- 11-2.** Solve Exercise 4.4.2. You are given the partition  $z_1 + z_2 + \cdots + z_k$  of  $n$ , and you now want to investigate the **conjugate partition**  $y_1 + y_2 + \cdots$ . Try to determine a rule that tells you the value of  $y_i$ , the  $i$ -th part of the conjugate partition, as some function of the  $z$ -values. (Instead of appealing directly to the Ferrers diagram.)

Make sure to explain clearly why your rule works.