MATH 118, WINTER '16

HOMEWORK 3

Due Monday, Feb 22

1. Find the expected value and variance for the number of parts of size r in a composition for a fixed r. Is the distribution concentrated?

2. What does your answer to the first question tell you about the average "shape" of a composition when you sort the parts in increasing order?

3. Find a functional equation for the bivariate generating function $f(z, u)$ that counts walks (z tracks length, u tracks final height) which on odd-numbered steps (the first, the third, etc) can step from height k to one of the heights $\{k, k + 1, k + 2\}$ and on even-numbered steps (the second, the fourth, etc) can hop down from height k to any height in $\{1, 2, \ldots, k - 1\}$ or stay at height k. (*Note:* This is not quite the usual hop down because you cannot return to the axis.)