

## Homework 7

due Friday May 30, 2014 in class

**1.** Stanley, Chapter 8.2

Using the hook-length formula, show that the number of SYT of shape  $(n, n)$  is the Catalan number  $C_n = \frac{1}{n+1} \binom{2n}{n}$ .

**2.** Stanley, Chapter 8.3

How many maximal chains are in the poset  $L(4, 4)$ , where  $L(m, n)$  is the poset we discussed for partitions in an  $m \times n$  rectangle? Express your answer in a form involving products and quotients of integers (no sums).

**3.** Stanley, Chapter 8.5

Show that the number of odd hook lengths minus the number of even hook lengths of a partition  $\lambda$  is a triangular number (a number of the form  $k(k+1)/2$ ).