MAT 146 University of California Spring 2014

Homework 5

due Friday May 16, 2014 in class

1. Stanley, Chapter 5.1

1. Let $G = \{\mathrm{id}, \pi\}$ be a group of order two with id the identity element. Let G act on $\{1,2,3,4\}$ by $\pi \cdot 1 = 2, \pi \cdot 2 = 1, \pi \cdot 3 = 3, \pi \cdot 4 = 4$. Draw the Hasse diagram of the quotient poset B_4/G.

2. Do the same for the action $\pi \cdot 1 = 2, \pi \cdot 2 = 1, \pi \cdot 3 = 4, \pi \cdot 4 = 3$.

2. Stanley, Chapter 5.11
In Example 5.4(b) the Hasse diagram of B_5/G is drawn, where G is generated by the cycle $(1,2,3,4,5)$ of order 5. Using the vertex labels shown in this figure, compute explicitly $\hat{U}_2(12)$ and $\hat{U}_2(13)$ as linear combinations of 123 and 124, where $\hat{U}_2$ is defined as in the proof of Theorem 5.8. What is the matrix of $\hat{U}_2$ with respect to the bases $(B_5/G)_2$ and $(B_5/G)_3$?

3. Stanley, Chapter 6.1(a)
Let $A(m,n)$ denote the adjacency matrix (over $\mathbb{R}$) of the Hasse diagram of $L(m,n)$. Show that if $A(m,n)$ is nonsingular, then $\binom{m+n}{m}$ is even.