

Math 4550 Hints for questions for March 10, 2009

1. Induction on the number of stackings. For the induction step you can either do it numerically, or think of a line shelling of P before the stacking where the $(d-1)$ -face you stack on top of is first (or last). Then do a line shelling of the polytope after the stacking where you do the faces of the boundary of the new simplex first (or last).
2. Unique factorization.
3. Prop. 2.3 of the text.
4. Prop. 2.3 of the text.
5. Write P as an \mathcal{H} -polytope using the hyperplanes whose affine spans are the facets of the boundary of P . Each such H can be written as $H = \{\mathbf{a} \cdot x = b, \mathbf{a} \in (\mathbb{R}^d)^*, b \in \mathbb{R}\}$. As long as $b > 0$, $\frac{1}{b}\mathbf{a} \in P^\circ$. Use this to show that $x \notin P \implies x \notin P^{\circ\circ}$. How do we know $b > 0$?