

Math 4550 Hints for questions for April 14, 2009

1. Let K' be the union of all of the rays through the origin and the points of K . It is sufficient to show that K' is a cone. (Why?). To see this, let

$$z = \sum c_i x_i$$

be a linear combination of elements of K' with $c_i \geq 0$. By definition of K' each x_i can be written as $t_i y_i$ where $t_i \geq 0$ and $y_i \in K$. rewriting z as

2. Let $\mathcal{A} = \{H_1, \dots, H_n\}$ be a nonessential hyperplane arrangement. Therefore,

$$V = \bigcap H_i$$

is a subspace of \mathbb{R}^d of dimension at least one. Let $U = V^\perp$ be the orthogonal complement of V . Now set $\mathcal{A}_U = \{H_1 \cap U, \dots, H_n \cap U\}$. As noted in class, \mathcal{A}_U is an essential hyperplane arrangement. Since every cone of the original hyperplane arrangement contains U (WHY?) the dimension of the cones in \mathcal{A}_U is ???

3. Euler's formula for polytopes.