

Math 4550 Questions for April 14, 2009

1. Let K be a convex subset of \mathbb{R}^d . Prove that the conical hull of K is the union of all rays through the points of K starting at the origin.
2. Show that if Euler's formula, $\sum_{i=0}^d f_i = (-1)^d$, holds for essential hyperplane arrangements, then it also holds for nonessential hyperplane arrangements.
3. Prove that if the fan of an essential hyperplane arrangements is the face fan of a polytope, then it satisfies Euler's formula (see # 2).
4. Prove that the two definitions of zonotope are the same.
5. Prove that the Minkowski sum of two nonempty convex sets is convex.
6. Let X, Y be nonempty subsets of \mathbb{R}^d . Prove that if $x + y, x \in X, y \in Y$ is an extreme point of the Minkowski sum $X + Y$, then x and y are extreme points of X and Y .