Math 724
Spring 2014
Homework Set 5

Exercise 1. Set $R = A[X_1, \ldots, X_4]$ and find an irredundant m-irreducible decomposition of the ideal $J = (X_1^2X_2^2X_3^2, X_1^3X_2^3X_4^3, X_1^2X_3^2X_4^2, X_2^4X_3^4X_4^4)R$ using our decomposition result for weighted facet ideals. Justify your answer.

Exercise 2. Let Δ be a simplicial complex on $V = \{v_1, \ldots, v_d\}$. Let Δ'' denote the set of non-faces of Δ, and let $\psi\colon \Delta'' \to \mathbb{N}_+$. Set $R = A[X_1, \ldots, X_d]$ and consider the face ideal J_Δ and the weighted face ideal J_Δ^ψ. Prove that $\dim(R/J_\Delta^\psi) = \dim(R/J_\Delta)$ where dim is the Krull dimension.