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Fröberg-Iarrobino Conjecture on fat points and its extensions to fat higher-dimensional subspaces.

Given maximal ideals $\mathfrak{m}_1, \dots, \mathfrak{m}_d$ of the graded ring $S = \mathcal{K}[X_0, \dots, X_n]$ and an ideal $I = \mathfrak{m}_1^{k_1} \cap \dots \cap \mathfrak{m}_d^{k_d}$ we consider $\dim(S/I)_m$ for each m : the Hilbert function of a collection of “fat points”. R. Fröberg and A. Iarrobino examine such dimensions and give an explicit conjectural function G (according to n, k_1, \dots, k_d , and d) along with conjectures on whether this is an upper bound for the Hilbert function and consider when equality occurs.

Previously we have observed — at least qualitatively — a geometric interpretation of these conjectures. Here, we explicitly calculate this geometric intersection value to show equality with the conjectured value G . Further it is natural to extend the Fröberg-Iarrobino hypotheses, conjectures, and formula toward any collection of fat projective subspaces of \mathbb{P}^n ; indeed this is required in the evaluation on points. We shall illustrate an approach toward verifying the extended hypotheses and conjecture. (Received August 17, 2014)