

Fall 2022, Math 621: Preliminary Problem Set 2
Due: Thursday, February 3rd, 2022
Graded Rings and Hilbert Functions

Preliminary problems. These problems should be completed before discussion on Thursday.

(P1) Let $I = \langle x^2, y \rangle \subset R = \mathbb{k}[x, y]$, under the standard grading. Find the following values of the Hilbert function $\mathcal{H}(R/I; t)$, and in each case, find a basis for $(R/I)_t$.

(a) $\mathcal{H}(R/I; 1)$

(b) $\mathcal{H}(R/I; 2)$

(c) $\mathcal{H}(R/I; 3)$

(d) $\mathcal{H}(R/I; 0)$