Fall 2022, Math 621: Preliminary Problem Set 10
Due: Thursday, April 7th, 2022
Gröbner Bases

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

(P1) Recall that in class, we divided

$$f = x^4y^2 + xy^2 - 2x \qquad \text{by} \qquad g_1 = xy^3 + x^2y - 2 \qquad \text{and} \qquad g_2 = x^2 - y$$

using glex order. Perform polynomial long division again under glex order, but with g_2 listed before g_1. You should obtain a **different** remainder than we obtained in class.

(P2) Use Buchberger's algorithm to obtain a Gröbner basis for

$$I = \langle x^2 - y^2, x^4y - xy^3 \rangle \subseteq \Bbbk[x, y]$$

under the glex term order. Your answer should consist of 3 polynomials.