

5. Let $f(x) = x^4 - x^3 - x^2 + 1$ and $g(x) = x^3 - 1$ in $\mathbb{Q}[x]$.

(a) Find the greatest common divisor $d(x)$ for $f(x)$ and $g(x)$ in $\mathbb{Q}[x]$.

(b) Express the greatest common divisor as $d(x) = u(x)f(x) + v(x)g(x)$ for some $u(x), v(x) \in \mathbb{Q}[x]$.

6. Show that $x^2 + x - 2$ is not irreducible in $\mathbb{Z}_3[x]$.