

PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Exam 2

Abstract Algebra 2

11-05-2017

1. Evaluate $\gcd(f, g)$ in $\mathbb{Z}_5[x]$, where $f = x^4 - x^3 + x^2 + 2x - 1$ and $g = 2x^3 - x^2 - 2$.
2. Factor $f = x^4 + x^3 + 3x - 2$ using irreducible polynomials in $\mathbb{Z}_7[x]$.
3. Find the minimal polynomial for $a = \sqrt{7} - \sqrt{2} \in \mathbb{R}$ over \mathbb{Q} .
4. Is $f = 9x^5 + 30x + 60$ reducible or irreducible in $\mathbb{Q}[x]$? Prove it.
5. Prove that $f = 16x^3 - x + 27$ is irreducible in $\mathbb{Q}[x]$.
6. Let $I = \{f \in \mathbb{Q}[x] \mid f(\sqrt{3}) = 0 \text{ and } f'(\sqrt{3}) = 0\}$, where f' stands for the first derivative of f defined in Calculus. Prove that I is an ideal in $\mathbb{Q}[x]$.

-Amin Witno