MATH 435

Additional Homework Exercises on the Polynomial Rings

A. Let $f(x) = 4x^5 + 3x^3 + 6x + 9$ and $g(x) = 3x^2 + 5x$ be polynomials in the ring $\mathbb{Z}_{11}[x]$.

a) Compute $f(x) + 4g(x)$, $f(x)g(x)$, and $g(x)^2$.

b) Applying polynomial division, determine the quotient and reminder upon dividing $f(x)$ by $g(x)$.

B. Factor the polynomial $f(x) = x^2 + 1$ in $\mathbb{Z}_{17}[x]$ into a product of linear factors. [Hint: Find a zero of this polynomial (either by trial and error or systematic search), then use the Factor Theorem.]