

1. Show that 1 is a zero of $f(x) = x^2 + 3x^3 + 2x + 4 \in \mathbb{Z}_5[x]$ using polynomial long division.
2. Determine the quotient and remainder upon dividing $f(x)$ by $g(x)$.
 - (a) $f(x) = 2x^3 + x^2 + 2$, $g(x) = x + 4$ in $\mathbb{Z}_5[x]$.
 - (b) $f(x) = x^4 + 2x^3 + 2x^2 + 4x + 4$ and $g(x) = x^2 + 3x + 3$ in $\mathbb{Z}_5[x]$.