<center>Background test</center>

1. Is there a 5×5-matrix a, with integer entries, such that $a^7 \neq 0$ and $a^{10} = 0$?

2. Are there nonabelian groups with 12 elements ?

3. Find the number of invertible $n \times n$ matrices with entries in a field $\Bbbk$ with q elements.

4. Find $\gcd(x^3 - 6x^2 + x + 4, \ x^5 - 6x + 1)$ in the ring $\mathbb{Q}[x]$, of polynomials with rational coefficients.

5. Is the set of all noninvertible elements of the ring $\mathbb{Z}/16\mathbb{Z}$, of residues modulo 16, an ideal of that ring ?