

1. True or false?
 - (i) If $f(x)$ has degree n then it has at least n distinct roots.
 - (ii) If $f(x)$ has n distinct roots then it has degree n .
 - (iii) If $f(x)$ has degree n then it has at most n distinct roots.
 - (iv) $\prod_{a \in \mathbb{F}_p} (x - a) = x^p + \cdots + (-1)x + 0 \in \mathbb{F}_p[x]$.

2. Compute the value of $p(x) = x^5 - 3x^2 + x + 3$ at $x = 5$ using Horner's method! Divide $p(x)$ by $x - 5$. What is the quotient and what is the remainder?

3.
 - (i) What is $5^{-1} \pmod{26}$?
 - (ii) Is 4 invertible modulo 26?

4. Compute the table of the operations of \mathbb{F}_3 and \mathbb{Z}_8 ! What is the table of multiplication in \mathbb{Z}_8^* ?

5. Divide $x^4 - 2x + 3$ with remainder by
 - (i) $x^2 - x + 2$,
 - (ii) $x + 1$,
 - (iii) $(x + 1)^2$,
 - (iv) $x^2 - 1$.

6. Show that every polynomial in $\mathbb{R}[x]$ of odd degree has at least one real root!