

**QUIZ 3**

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- (1) (4 points) Show that the polynomial  $x^2 + 9x$  can be factored in (at least) two different ways in  $\mathbb{Z}_{10}[x]$  as the product of non-constant polynomials that are not units.

- (2) (6 points) List all monic, irreducible polynomials of degree 2 in  $\mathbb{Z}_3[x]$ .

(3) (4 points) For what values of  $k$  is  $x + 1$  a factor of  $x^4 + 3x^3 + 2x^2 + 2kx + 3$  in  $\mathbb{Z}_5[x]$ ?

(4) (6 points) Consider the polynomial  $f = x^3 + x^2 + 2x + 1$ , viewed as a polynomial in  $\mathbb{Z}_p[x]$ . Determine whether  $f$  is irreducible when

(a)  $p = 3$

(b)  $p = 5$