

**QUIZ 2**

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- (1) (4 points) List all polynomials of degree at most 2 in  $\mathbb{Z}_2[x]$ .
- (2) (6 points) Let  $R$  be a commutative ring with unity  $1_R \neq 0_R$ . Which of the following subsets in  $R[x]$  are subrings of  $R[x]$ ? (Justify your answer, briefly.)
- (a) All polynomials with constant term  $1_R$ .
  
  
  
  
  
  
  
  
  
  
  - (b) All polynomials with constant term  $0_R$ .
  
  
  
  
  
  
  
  
  
  
  - (c) All polynomials of the form  $a_0 + a_2x^2 + \cdots + a_{2n}x^{2n}$ .
  
  
  
  
  
  
  
  
  
  
  - (d) All polynomials of degree at most 2.

(3) (10 points) Consider the following polynomials in  $\mathbb{Q}[x]$ :

$$f = x^4 + 4x^3 + x^2 - 8x - 6, \quad g = x^2 + x - 6.$$

(a) Use the Division Algorithm to find the quotient  $q$  and the remainder  $r$  of the division of  $f$  by  $g$ .

(b) Use the Euclidean Algorithm to compute the greatest common divisor of  $f$  and  $g$ .