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# Math 321: Foundations of Abstract Algebra

HOMWORK 10 : DUE MAY 1

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1. Determine (with explanation) whether the following polynomials are irreducible in the rings indicated.
  - (a)  $X^4 + X + \bar{1} \in \mathbb{Z}/2\mathbb{Z}[X]$
  - (b)  $X^2 + X + \bar{4} \in \mathbb{Z}/11\mathbb{Z}[X]$
  - (c)  $X^6 + 30X^5 - 15X^3 + 6X - 120 \in \mathbb{Z}[X]$
  - (d)  $X^2 + X + 4 \in \mathbb{Z}[X]$
  - (e)  $\frac{3}{7}X^4 - \frac{2}{7}X^2 + \frac{9}{35}X + \frac{3}{5} \in \mathbb{Q}[X]$  (Hint: Part (a) might come in handy).
2. 20.1
3. 20.6
4. 20.7 b,c,e
5. 21.11
6. 20.10 (There's a reason I put this problem where I did in the problem set.)
7. (a) 21.13  
(b) 21.14
8. 21.21