

Written Assignment No. 3

due November 11, 2005

General Directions: Written assignments should be submitted typeset. What you submit must represent your own work.

Assigned Exercises

Read these directions carefully: For each of the following statements either provide a proof that the statement is true or label the statement as false and provide justification.

1. If \mathbf{Z} denotes the ring of integers and \mathbf{R} denotes the field of real numbers, then

$$\left\{ a + b\sqrt[3]{2} \in \mathbf{R} \mid a, b \in \mathbf{Q} \right\}$$

is a subring of \mathbf{R} .

2. If F is a finite field with $|F| = q$ and $F[t]$ denotes the ring of polynomials with coefficients in F , then the number of elements in the ring

$$A = F[t]/(t^q - t)F[t]$$

(of all congruence classes of polynomials modulo the polynomial $t^q - t$) is given by

$$|A| = q^q .$$