

**Always justify** your answers, even if the question does not explicitly say so. Write your own solutions, independently of anyone else.

**Core Problems:** Everyone must turn these problems in.

- I. Sec. 2.4 # 1 be, 2 bc.
- II. Sec. 2.4 # 5 (You may **NOT** use the quadratic or cubic formulas or their proofs, nor complete the square, etc.—use the hint. You don't need to prove #3.1.15.)
- III. Sec. 2.4 # 9.
- IV. Sec. 3.1 # 1 de, 2 bd.
- V. Sec. 3.1 # 5 (Here,  $f(x), g(x) \in R[x]$ , where  $R$  is a commutative ring. Does it make any difference if  $R$  is an integral domain? a field?)
- VI. Sec. 3.1 # 10 def.

**Advanced Problems:** Due Wed. Oct. 14. Students registered for 6000 must turn these problems in. They count for extra credit for 4000 students, but anyone hoping to get an 'A' in 4000 should do a reasonable number of advanced problems. Please hand in Advanced Problems separately from Core Problems.

- VII. Sec. 2.4 # 10.
- VIII. Sec. 3.1 # 23. (Part (a) is the most challenging — the case where  $1 + 1 = 0$  —  $\mathbb{Z}_2$  is not the only finite field with that property — see #2.4.9 — which is what makes this challenging.)