

**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. 3.3 # 2 abcd. (If  $f(x)$  is irreducible, use the easiest test possible [in the sense described in class]. Otherwise, give a factorization.)

II. Sec. 3.3 # 7 (More hints:  $\sum_{i=0}^n \sum_{j=0}^i a_{ij} = \sum_{j=0}^n \sum_{i=j}^n a_{ij}$ . Asst. 1 problem V might be helpful; and remember that  $\binom{n}{k} = \binom{n}{n-k}$ .)

III. Sec. 3.3 # 8.

IV. Sec. 5.1 # 3, 5, 11 cdef (in e., first prove that  $\mathbb{Q}[\sqrt{3}] \subset \mathbb{Q}[\sqrt{3} + i]$ ).

**Advanced Problem:** Due Wed. Oct. 28. 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.

V. Sec. 3.3 # 10.