

**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. 1.3 # 1, 10, 11 (you are to use a. in doing b.), 12, 16, 17.

II. (a) What is the last digit of  $19^{62}$ ? Of  $19^{23}$ ?

(b) What are the last two digits of  $19^{62}$ ? Of  $19^{23}$ ?

[You should not have to compute any very high powers! Use modular arithmetic and simplify as you go along. Don't forget to consider using negative numbers if that will simplify the computation.]

III. Sec. 1.3 # 20 cg [You must show all your work — don't merely invoke the formulas of the theorem, or use trial and error, inspection, etc.]

**Advanced Problems:** Due Wed. Sep. 16. 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.

IV. Sec. 1.3 # 14, 31