

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. 1.4 # 5 (give reasons in d.), 9, 12, 13 (you must show that the hint can be done!).
- II. (a) Find the multiplicative inverse of $\overline{26}$ in \mathbb{Z}_{105} , or explain why it does not exist. (Do not use trial and error!)
(b) Find the multiplicative inverse of $\overline{45}$ in \mathbb{Z}_{105} , or explain why it does not exist.
- III. Sec. 2.1 # 2 (prove for all ordered rings), 5, 8.

Advanced Problems: Due Wed. Sep. 30. 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. Find all three-digit numbers a with the property that, for all $n \in \mathbb{N}$, a^n has the same final three digits as a . (For full credit, you must not use **any** trial-and-error.)
- V. Sec. 2.1 # 16.