

Math 453, Section X, Spring 2008
HW Assignment 5, due Friday, 2/22/2008
Note the early due date!

Name (print please):

- **Rules:** The usual: Write your name on the cover sheet and staple the sheet to the assignment. Only the problems marked by an asterisk are to be turned in. Do these problems in order, and make sure that each problem is clearly labelled.
- **Deadline:** Because of the Midterm Exam on February 27, I am giving out the assignment earlier, and have advanced the due date to Friday; that way you'll get the graded papers back before the test, and you still have a full week to do the assignment.
- **Open House Hours:** Wednesdays and Thursdays, at 5 pm, in 141 Altgeld. I'll stay as long as needed. The Open House is an informal office hour for students in my classes. It is intended as the main point of contact, and the place to go, for questions about the homework, or other questions about the course. (On Wednesdays, my Math 408 students will have some priority as their hw due date is Friday. On Thursday, 453 will have priority.)

Comments and Hints

- **Problem 47:** Hint: Exploit the symmetry between residues at the bottom of the range $\{1, 2, \dots, p-2, p-1\}$ and those at the top of this range: $p-1 \equiv (-1) \cdot 1$, $p-2 \equiv (-1) \cdot 2$, $p-3 \equiv (-1) \cdot 3$, etc.
- **Problems 57 and 59:** Hint: Use the following general result (which is also alluded to in the hint to 57(a) in the back of the book): If $(m_1, m_2) = 1$, then a congruence modulo $m_1 m_2$ is equivalent to a system of two congruences, one modulo m_1 and the other modulo m_2 . (This came up in a recent hw problem; it rests on the fact that, if $(m_1, m_2) = 1$, then divisibility by $m_1 m_2$ is equivalent to simultaneous divisibility by m_1 and m_2 .) The result generalizes in an obvious manner to more than two pairwise relatively prime moduli, so it can be applied, for example, to $42 = 2 \cdot 3 \cdot 7$.
- **Problems from 2.6:** For these problems you may use the table of values of $\phi(n)$ given in Appendix E.

HW 5 Problems (all from Chapter 2 of Strayer)

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| 1. * 47(a) | 9. * 68(b) |
| 2. * 51(b) | 10. * 69(b) |
| 3. * 51(c) | 11. * 69(d) |
| 4. * 54(a) | |
| 5. * 57(b) | |
| 6. * 59 | |
| 7. * 62(a) | |
| 8. * 68(a) | |