

Math 453, Section X, Spring 2008  
HW Assignment 4, due Monday, 2/18/2008

**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. The assignment is due in class next Monday; late homework, or homework dropped off in mailboxes, will not be accepted, but you can turn in the homework early, in my office, any time before the due date.
- **Open House Hours:** Wednesdays and Thursdays, at 5 pm, in 141 Altgeld. I'll stay as long as needed, typically till around 6:00–6:30 pm. 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.)

**HW 4 Comments and Hints**

- **Solving congruences:** Most of the problems in this assignment are computational problems that ask to solve a given congruence or a given system of congruences. To do this, *you must use the appropriate algorithms*. While one could arrive at the answer by guessing or by brute force (such as trying out in turn every  $x$  modulo  $m$ , and checking if it satisfies the congruence), this would defy the purpose of the problem (which is to practice the appropriate algorithm), and you won't get credit for such attempts.
- **Calculators:** I strongly recommend that you do the computational problems without using a calculator; in most problems the numbers are small enough that one can easily do the necessary arithmetic by hand. In exams, you won't be able to use a calculator, and having some practice working efficiently without a calculator is essential there.
- **Problem 34(b):** First rewrite the third congruence in an equivalent form as a congruence modulo 3, so that the appropriate coprimality condition is satisfied. Then, compute the appropriate modular inverses of the coefficients of  $x$  and convert the system to one of the standard form to which the Chinese Remainder Theorem applies.
- **Problem 36:** This is a routine Chinese Remainder Theorem problem, disguised as a puzzle (involving pirates killing each other off ...). It is one of many such puzzles that are floating around (another one is Problem 37).

**HW 4 Problems (all from Chapter 2 of Strayer)**

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|------------|---------------------------|--------------|
| 1. * 28(d) | 7. * 36 (assume $p > 2$ ) | 9. 28(a)(c)  |
| 2. * 29(b) | 8. * 43(a)(b)             | 10. 33(a)(c) |
| 3. * 29(d) |                           | 11. 42(a)(c) |
| 4. * 32    |                           |              |
| 5. * 33(d) |                           |              |
| 6. * 34(b) |                           |              |