

Name:

Collaborator(s)¹:

Math 453, Section X13, Prof. Hildebrand, Spring 2011

HW Assignment 2, due Monday, 2/7/2011

Instructions

- **Write your name on the cover sheet and staple the sheet to the assignment.** Do the problems in order, and make sure that each problem is clearly labelled. **The assignment is due in class at the above due date; late homework, or homework dropped off in mailboxes, will not be accepted.** (You can, of course, turn in the homework early, in my office, any time before the due date).
- **Getting help:** Open House hours are Wednesdays and Thursdays, 5 pm – 6 pm (and beyond if necessary), in 159 Altgeld; if there is enough interest, I'll add another slot. The Open House is an informal office hour for students in my classes and is intended as the main point of contact. I'd also be happy to answer short questions by email (ajh@illinois.edu); for questions that require a longer, more technical, answer, however, email is not a suitable medium, and it is better to ask in person.
- **Write-up:** Solutions, rather than answers, are expected for all problems. Even for non-proof problems, an answer alone (“23”, “yes”, “true”, “false”) is not sufficient; you need to show how you arrived at the answer. Some of the problems require formal proofs. Proofs must be properly written up, with correct mathematical notation and terminology, and in complete sentences. Use the examples from in class and in Strayer text as models for your own proofs. You can use any result covered in class, the class handouts, and the relevant sections of the Strayer text.

HW 2 Problems

All problems are from Chapter 1 of Strayer, Sections 1.4–1.5. **Only turn in those problems marked by an asterisk.** Problems marked by an “H” have a hint in the book or below.

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|--------------------------|---------------------|--------------|
| 1. *54(a) | 5. *75 (H) | 9. 55 |
| 2. *56 | 6. *76(a)(b)(c) (H) | 10. 59(a)(c) |
| 3. *64 | 7. *78 | 11. 60(a)(c) |
| 4. *69 (H ²) | 8. *84 (H) | 12. 61(a) |
| | | 13. 65(a)(c) |
14. ***Extra credit challenge:** Prove that there are infinitely many primes *beginning* with the digits 453. (This is the counterpart to #84, which asked to show that there are infinitely many primes *ending* with a given string of digits (namely k 1's), but it requires a completely different approach. In order to earn extra credit, you must give a rigorous, properly written up, proof. You may use any theorem from Chapter 1 of Strayer and the definition/theorem handout from class, but not other resources. There is nothing special about the digits 453—the same result holds for any finite string of digits, but the write-up of the proof is a bit easier if one can work with concrete digits.)

¹If you worked with another student or in a small group on this assignment, list the names of all students involved.

²Hint: consider first the case when n is a prime power