

CS 2802: Homework 5

February 17, 2020

Handed out Feb. 17; due March 2 (in two weeks!). This is a little long, so don't leave it until the end. But it will be useful preparation for the prelim!

- Read Chapter 9 (except for 9.10, which we won't cover, other than Fermat's Little Theorem, at the end)
- Do the following problems:
 - 9.3
 - 9.7
 - 9.8(a)
 - 9.11 [Hint: Theorem 9.2.2 is *really* useful here.]
 - 9.30(i), (ii), (iii) (If the statement is true, provide a short proof; if it's false, give a counterexample.)
 - 9.46
 - 9.50
 - 9.62(a),(b),(c) [Hint: for part (a), you can use the results of Exercise 9.11, whether or not you actually got the right proof.] Think about (but don't hand in) 9.62(d).
 - 9.80
 - Extra problem 1: Prove that if $a|b$ and $b|c$, then $a|c$.
 - Extra problem 2: Suppose you can show that (a) $P(0)$ holds and (b) for all n , if $P(n)$ holds, then so does (i) $P(n + 3)$ and (ii) $P(2n + 1)$. What can you conclude? Formally, you have to find the smallest set that contains 0 and if it contains n , it also contains $n + 3$ and $2n + 1$. (Hint: Try some numbers and use a little number theory.) Prove whatever you claim carefully!
 - Challenge problem (don't hand it in): The sum of two positive integers is 2310. Can their product be divisible by 2310? (Hint: modular arithmetic is useful here. Also, there's nothing particularly special about 2310. Think about 35 or 77 first to get your intuitions in gear.)

You should be able to do 9.76 and 9.79, although you don't have to hand them in. Some of you might find 9.85 interesting, although again, you don't have to hand it in.