CSCI 2200 — Foundations of Computer Science (FoCS)
Problem Set 2 (document version 1.1)

Overview

- This problem set is due at your Wednesday, September 21 recitation
- You may work on this problem set in a group of no more than four students; **each of your teammates must be in your recitation section**
- Please start this problem set early and ask questions during office hours and at your recitation section; also ask (and answer) questions on the Discussion Forum
- You can type or hand-write (or both) your solutions to the required graded problems

Problems

These problems are generally good practice problems to work on. Those marked with an asterisk (*) are required and will be reviewed/graded in recitation.

- **Problem 3.28.**
- **Problem 3.30.**
- **Problem 4.6.**
- **Problem 4.8.**
- ***Problem 4.9.**
- **Problem 4.12(a)-(g),(i)-(n).**
- ***Problem 4.12(h).**
- ***Problem 4.15(a).**
- ***Problem 4.16(k).**
- **Problem 4.17.**

(v1.1) Some of the above problems are transcribed below.

- ***Problem 4.9.** You may assume n is an integer. Give direct and contraposition proofs of:
  (a) ($n^3 + 5$ is odd) $\rightarrow$ (n is even).
  (b) (3 does not divide n) $\rightarrow$ (3 divides $n^2 + 2$).

- ***Problem 4.12(h).** Prove by contradiction:
  (h) $(x, y) \in \mathbb{Z}^2 \rightarrow x^2 - 4y - 3 \neq 0$.

- ***Problem 4.15(a).** Prove these if and only if claims. You must prove two implications. (Break the proof into cases.)
  (a) Prove: 4 divides $n \in \mathbb{Z}$ IF AND ONLY IF $n = 1 + (-1)^k(2k - 1)$ for $k \in \mathbb{N}$. (Try $n < 0$, $n = 0$, $n > 0$; k even/odd.)

- ***Problem 4.16(k).** Determine the type of proof and prove. Tinker, tinker, tinker.
  (k) If n is odd, then $n^2 - 1$ is divisible by 8.