Harvard University
Computer Science 20

Problem Set 2

Due Thursday, February 11, 2021 at 11:59pm

SELF CHECK

- Did you clearly state the claim at the beginning of your proof?
- Did you clearly conclude your proof with a statement of what you have proved?
- Is each assertion either a given fact, a hypothesis, a definition, or a logical conclusion from prior statements?
- Are all of your variables properly introduced and quantified? Is the domain of variables clearly specified?
- Does your proof proceed logically from claim to conclusion?
- Have you removed any extraneous information or tangents that were part of your exploratory work?
- Have you considered corner cases? If you are dividing your proof into cases, have you exhausted all cases?

PROBLEM 1

If x and y are integers and $x^2 + y^2$ is even, prove that $x + y$ is even.

PROBLEM 2

Prove or disprove: If $12 \mid x^2$, then $12 \mid x$

PROBLEM 3

The integers a and b are *relatively prime* if $\text{GCD}(a, b) = 1$. Prove the following claim:

Claim: If $ax \equiv 1 \pmod{b}$ for some $x \in \mathbb{Z}$, then a and b are relatively prime.

Problem set by **FILL IN YOUR NAME HERE**

Collaboration Statement: **FILL IN YOUR COLLABORATION STATEMENT HERE (See the syllabus for information)**