

Discrete Math 2200. Problem Set 5

Due date: Thursday, October 9, in class. Late homeworks are not accepted, except for a medical or some other university approved reason.

Unless specified otherwise, the numbering of the exercises below is as in the textbook (Rosen, ed. 6). Only even numbered exercises will be graded, but I recommend you try to do all of them for practice.

Problem 1. Division, congruences: sec. 3.4, page 209: ex. 9bc, 16, 22, 23, 24, 31.

Problem 2. Primes, g.c.d.: sec 3.5., page 217-218: ex. 3ef, 5, 8, 11, 12ab, 14, 17, 18, 19, 21, 24, 31.

Problem 3. Define the relation \sim on the set of real numbers by:

$$x \sim y \text{ if and only if } x - y \text{ is a rational number.}$$

Prove that this is an equivalence relation by checking the axioms:

- (i) (reflexivity) $x \sim x$ for any x ;
- (ii) (symmetry) if $x \sim y$, then $y \sim x$, for every x, y ;
- (iii) (transitivity) if $x \sim y$ and $y \sim z$, then $x \sim z$, for every x, y, z .

If we change the definition to

$$x \sim' y \text{ if and only if } x - y \text{ is zero or an irrational number,}$$

is $x \sim' y$ an equivalence relation?

Extra problem(s) will not be graded: page 217-218: 6, 9, 33, 36.