

Math 2001 - Assignment 11

Due November 13, 2015

- (1) Show for all $a, b \in \mathbb{N}$:

$$\gcd(a, b) \cdot \text{lcm}(a, b) = ab$$

- (2) Prove or disprove that the following relations are reflexive, symmetric, antisymmetric, transitive:

(a) $<$ on \mathbb{Z}

(b) \neq on \mathbb{Z}

(c) \subseteq on the power set $P(A)$ of a set A

- (3) Prove or disprove that the following relations are reflexive, symmetric, antisymmetric, transitive:

(a) $|$ (divides) on \mathbb{N}

(b) $R = \{(x, y) \in \mathbb{R} : |x - y| \leq 1\}$

(c) $S = \{(1, 2), (1, 3), (2, 2), (2, 3), (3, 2)\}$ on $\{1, 2, 3\}$

- (4) List the equivalence classes for these equivalence relations:

(a) The relation “has the same size” on the power set of $\{1, 2, 3\}$

(b) \equiv_n on \mathbb{Z}

(c) $R = \{(x, y) \in \mathbb{Z} : |x| = |y|\}$ on \mathbb{Z}

- (5) How many different equivalence relations are there on $A = \{1, 2, 3\}$? Describe them all by listing their equivalence classes.

- (6) Given finite sets A and B . How many different relations are there from A to B ?