

Intro to Mathematical Reasoning (Math 300) – Homework 7<sup>1</sup>

1. End of Chapter 4, problem 12.
2. Recall that a relation is a set whose elements are ordered pairs. Now let  $A$  be a set and let  $Q$  and  $R$  be relations on  $A$ .
  - (a) Prove or disprove: if  $Q$  and  $R$  are partial order relations then so is  $Q \cup R$ .
  - (b) Prove or disprove: if  $Q$  and  $R$  are partial order relations then so is  $Q \cap R$ .
3. Say that two positive integers  $x$  and  $y$  are *friendly* if there are nonzero integers  $a$  and  $b$  such that  $a^2x = b^2y$ . Prove that friendliness is an equivalence relation on the set of positive integers. (Note: in your proof you are not permitted to use the fact that every integer has a unique factorization into primes.)
4. End of Chapter 4, problem 17.
5. Prove Theorem 4.3.21
6. Exercises 5.1.10 and 5.1.12

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<sup>1</sup>Version 2/29/04