## Homework due on Wednesday, March 30

Read carefully sections 6.1-6.4 in the book. Read the notes about relations linked on the course page. Solve the following problems.

**Problem 1.** Let p be a prime number. Prove that for any integer k > 0, if  $a_1, \ldots, a_k$  are integers and  $p|a_1a_2\ldots a_k$  then  $p|a_i$  for some  $i, 1 \le i \le k$ . Hint: Induction on k.

**Problem 2.** a) Let p > 1 be a positive integer which has the following property: for any integers a, b, if p|ab then p|a or p|b. Prove that p is a prime.

b) Assuming that  $p_1, p_2, \ldots, p_n$  is the list of all prime numbers, what can you say about prime factorization of the number  $1 + p_1 p_2 \ldots p_n$ ? Conclude that the set of prime numbers is infinite.