

**MATH 321: HOMEWORK 2**  
**DUE FRIDAY, JAN 29 BY 11:00PM**

**Problem 1.** Prove that if you multiply an irrational number by a nonzero rational number then the product must be irrational.

**Problem 2.** Prove that if  $p$  and  $q$  are distinct primes which both divide an integer  $n$  then  $pq$  divides  $n$ . [Hint: a useful fact about primes is that if  $p$  and  $q$  are primes then  $p$  divides  $q$  if and only if  $p = q$ .]

**Problem 3** (Extra Credit). Prove that if  $p_1, p_2, \dots, p_k$  are finitely many distinct primes each of which divides an integer  $n$ , then the product  $p_1 p_2 \cdots p_k$  divides  $n$ .

**Problem 4.** Do Exercise 3.2 from page 25 of the textbook.

**Problem 5.** Do Exercise 3.4 from page 25 of the textbook.