

**Homework 2**

due 5:00 pm, Monday, June 22

Hand in:

From the Study Guide: page 10, §1.2 #37, 40, 45, 46

37. Find the prime factorizations of 252 and 180 and use them to compute the greatest common divisor and least common multiple of 252 and 180.
40. Find the prime factorizations of 13651 and 3179 and use them to find  $\gcd(13651, 3179)$ .
45. Let  $a, b, c$  be positive integers.
- (a) Prove that if  $\gcd(a, bc) = 1$  and  $\gcd(b, c) = 1$ , then  $\gcd(ab, c) = 1$ .
  - (b) Prove or disprove the following generalization of part (a): if  $\gcd(b, c) = 1$ , then  $\gcd(a, bc) = \gcd(ab, c)$ .
46. Let  $a, b, c$  be positive integers with  $a^2 + b^2 = c^2$ .
- (a) Show that  $\gcd(a, b) = 1$  if and only if  $\gcd(a, c) = 1$ .
  - (b) Does  $\gcd(a, b) = \gcd(a, c)$ ?

From the textbook, page 24, §1.2 #23, 25

6. For each of the following numbers, give a diagram of all divisors of the number, showing the divisibility relationships.      (a) 60      (b) 1575
23. Show that if  $n$  is a positive integer such that  $2^n + 1$  is prime, then  $n$  is a power of 2.