

## Math 220 – Homework 13

Due Thursday 05/04/17 at the beginning of Final Exam.

### PART A

Problems from the textbook:

- Section 5.4 # 2 (hint: use proof by contrapositive), 6(c,d) (Hint: Proposition 5.4.4 and its corollaries), 8(b,c), 9, 10(a).

### PART B

1. Determine the following, representing your answer in the compact standard form:

$$\gcd(2^{2016} \cdot 3^4 \cdot 55 \cdot 7^2, 6 \cdot 3^2 \cdot 77)$$

2. Prove that if  $p$  is a prime number greater than 3, then  $p$  is of the form  $3k + 1$  or  $3k + 2$ .
3. Let  $a, b, c, d \in \mathbf{Z}$ . Prove or disprove the following statements.
  - (a)  $2|ab(a + b)$ .
  - (b)  $(a|b \wedge c|d) \Rightarrow ac|bd$ .
  - (c) If  $a|b$  and  $b|a$  then  $a = b$ .