

## Math 220 – Homework 3

Due Wednesday 02/10 at the beginning of class

### PART A

Problems from the textbook:

- Section 1.4 # 5, 7, 14, 20

### PART B

1. Let  $x \in \mathbf{R}$ . Prove that if  $0 < x < 1$ , then  $x^2 - 2x + 2 \neq 0$ .
2. Prove the following statement:

“Let  $n \in \mathbf{Z}$ . Then  $n$  is odd if and only if  $11n - 7$  is even.”

3. Prove that if  $n \in \mathbf{Z}$ , then  $n^3 - n$  is even.
4. Prove that  $x - y$  is even if and only if  $x$  and  $y$  are of the same parity.
5. Let  $a$  and  $b$  be integers, where  $a \neq 0$ . Prove that if  $a|b$ , then  $a^2|b^2$ .
6. (a) Let  $n \in \mathbf{Z}$ . Prove that if  $2|(n^2 - 5)$ , then  $4|(n^2 - 5)$ .  
(b) Give an example of an integer  $n$  such that  $2|(n^2 - 5)$ , but  $8 \nmid (n^2 - 5)$