

1. Suppose  $a$  and  $b$  are integers. Prove each of the following:
  - (a) If  $a$  and  $b$  are both odd, then  $a + b$  is even.
  - (b) If  $a$  is even and  $b$  is odd, then  $a + b$  is odd.
  - (c) If  $a + b$  is odd, then  $a$  and  $b$  have opposite parity.
2. Suppose  $a$  and  $b$  are negative integers. Prove that, if  $a < b$ , then  $a^2 > b^2$ .
3. Suppose  $a$  and  $b$  are positive integers. Prove that, if  $a|b$ , then  $a \leq b$ .
4. Suppose  $a > 0$  and  $b \geq 0$  are integers such that  $a|b$ . Prove that, if  $b < a$ , then  $b = 0$ .  
(Typo corrected. This previously said  $a = 0$ .)
5. Suppose  $a$  and  $b$  are integers. Prove that  $ab + a + b$  is even if and only if both  $a$  and  $b$  are even.
6. Suppose  $n$  is an integer. Prove that  $n^2$  is even if and only if  $4|n^2$ .