

## Math 156: Workshop 5

Write your solutions neatly, or else points will be deducted. Prove the following.

1. (p.110 #2) Suppose  $n \in \mathbb{Z}$ . If  $n^2$  is odd, then  $n$  is odd.
2. (p.110 #4) Suppose  $a, b, c \in \mathbb{Z}$ . If  $a \nmid bc$ , then  $a \nmid b$ .
3. (p.110 #18) For any  $a, b \in \mathbb{Z}$ , it follows that  $(a + b)^3 \equiv a^3 + b^3 \pmod{3}$ .
4. (p.110 #6) Suppose  $x \in \mathbb{R}$ . If  $x^3 - x > 0$ , then  $x > -1$ .
5. (p.118 #4) Prove that  $\sqrt{6}$  is irrational.
6. (p.118 #10) There are no integers  $a, b$  such that  $21a + 30b = 1$ .
7. (p.118 #16) If  $a, b \in \mathbb{R}$  and  $a, b > 0$ , then  $a + b \geq 2\sqrt{ab}$ .