

**MATH 271 – Summer 2016**  
Practice problems – Week 6  
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1. Let  $a, b, m$  be integers such that  $m > 1$ . Assume that  $a \equiv b \pmod{m}$ . Using only the definition of  $\pmod$  and the definition of divisibility, prove that  $a^2 \equiv b^2 \pmod{m}$ .
2. Reduce each of the following modulo  $n$ .
  - (a)  $7 \cdot 9$  for  $n = 2, 4, 5, 8, 11$ .
  - (b)  $15 \cdot 23$  for  $n = 2, 4, 5, 8, 11$ .
  - (c)  $(-12) \cdot 17$  for  $n = 2, 4, 5, 8, 11$ .
  - (d)  $(-12) \cdot (-7)$  for  $n = 2, 4, 5, 8, 11$ .
3. Solve each of the following congruences for  $x$ .
  - (a)  $x + 17 \equiv 31 \pmod{5}$
  - (b)  $x + 27 \equiv -10 \pmod{13}$
  - (c)  $2x + 5 \equiv 3 \pmod{7}$
  - (d)  $2x + 5 \equiv -3 \pmod{11}$
  - (e)  $4x + 7 \equiv 1 \pmod{9}$
  - (f)  $15x + 12 \equiv -11 \pmod{49}$
  - (g)  $-15x + 22 \equiv -9 \pmod{28}$