

1) Solve  $3x = 6 \pmod{9}$ .

Here note that 3 is *not* invertible mod 9. Hence we'll resort to brute force and try all the possible answers:

$$3 \cdot 0 \equiv 0 \not\equiv 6$$

$$3 \cdot 1 \equiv 3 \not\equiv 6$$

$$3 \cdot 2 \equiv 6$$

$$3 \cdot 3 \equiv 0 \not\equiv 6$$

$$3 \cdot 4 \equiv 3 \not\equiv 6$$

$$3 \cdot 5 \equiv 6$$

$$3 \cdot 6 \equiv 0 \not\equiv 6$$

$$3 \cdot 7 \equiv 3 \not\equiv 6$$

$$3 \cdot 8 \equiv 6$$

From the above we see that there are three solutions:  $x = 2, x = 5,$  and  $x = 8$ .