1. Prove the following

**Theorem.** Suppose \( \gcd(c, m) = 1 \) and \( ac \equiv bc \mod m \). Then \( a \equiv b \mod m \).

2. Can you apply the above theorem to solve the following equations for \( x \in \mathbb{Z}_{12} \)?

(a) \( 5x \equiv 10 \mod 12 \)

(b) \( 6x \equiv 6 \mod 12 \)

In the case when the theorem of cancellation applies, find \( x \). In the case when it does not apply find an example where there is congruence before cancellation, but not after.

*Caution:* DO NOT express the solution to a linear congruence \( ax \equiv b \mod m \) as \( x = \frac{b}{a} \) as you would the solution to the linear equation \( ax = b \).