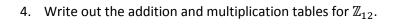
1. Let a and b be integers with n and k positive integers such that if $a \equiv b \mod n$ and $k \mid n$, prove that $a \equiv b \mod k$.

2. Prove part (8) of Theorem 2.7. (Be sure to give the statement of the theorem.)

3. Let a, b, n be integers with n > 1. Let $d = \gcd(a, n)$. If [a]x = [b] has a solution in \mathbb{Z}_n , prove that d|b. [Hint: if x = [r] is a solution, then [ar] = [b] so that ar - b = nk for some integer k.]



- 5. Answer the following computational questions. Show all necessary work.
 - a. Find an element of \mathbb{Z}_7 such that every non-zero element of \mathbb{Z}_7 is a positive power of that element.

b. Solve the equation: $x^2+1=0$ in \mathbb{Z}_{12} . You may assume that $0\leq x<12$.