Math 2326 - Introduction to Abstract Mathematics
Assignment 18 - Due Monday, March 3

Problem 64: Suppose that $a, b, c \in \mathbb{Z}$ with $\gcd(a, b) = 1$. Show that if both a and b divide c, then ab divides c.

Problem 65: Suppose $n \in \mathbb{N}$ and let $a, b, c, d \in \mathbb{Z}$ such that

$$\begin{aligned} a &\equiv b \pmod{n} \quad \text{and} \\ c &\equiv d \pmod{n}. \end{aligned}$$

a. Show that $(a + c) \equiv (b + d) \pmod{n}$.

b. Show that $ac \equiv bd \pmod{n}$.

Problem 66: Let G be a group and assume $a, b, c \in G$.

a. Prove the cancellation law of groups: *$ba = ca$ implies $b = c$ and $ab = ac$ implies $b = c$.*

b. Show that $ab = ca$ does not necessarily imply that $b = c$.

Problem 67: Prove the following statement: *In a group G, inverses are unique.*