1. Do problems 3.3: 9a, 13, 20

2. Let \( n \in \mathbb{N}_{>0} \) be given. In class we proved that, if \( a, b, c \in \mathbb{Z} \) such that \( a \cdot b \equiv a \cdot c \pmod{n} \) and \( \gcd(a, n) = 1 \) then \( b \equiv c \pmod{n} \). Actually, more is true. Suppose now that \( n > 1 \) and for all \( b, c \in \mathbb{Z} \) if \( a \cdot b \equiv a \cdot c \pmod{n} \) then \( b \equiv c \pmod{n} \). Prove that \( \gcd(a, n) = 1 \). Hint: Suppose not. Then there is \( d > 1 \) and \( s, t \in \mathbb{Z} \) such that \( ds = a \) and \( dt = n \). Consider \( a \cdot (t) \equiv a \cdot (2t) \pmod{n} \).

3. Let \( a \in \mathbb{Z} \) and \( n \in \mathbb{N}_{>0} \) such that \( a \not\equiv 0 \pmod{n} \). Prove that there is \( b \not\equiv 0 \pmod{n} \) such that \( ab \equiv 0 \pmod{n} \) if and only if \( \gcd(a, n) \neq 1 \).

4. Do problems 4.2: 1, 3, 10, 16, 17

   The grader will carefully consider 4.2.3 and 4.2.17.