Answer the following questions:

1. Prove or disprove that if a|bc, where a, b, and c are positive and a ≠ 0, then a|b or a|c.

2. What time does a 24-hour clock read:
a) 100 hours after it reads 2:00?
b) 45 hours before it reads 12:00?

3. Find the integer a such that:
a) $a \equiv 17 \pmod{29}$ and $-14 \leq a \leq 14$.
b) $a \equiv -11 \pmod{21}$ and $90 \leq a \leq 110$.

4. Show that if n is an integer then $n^2 \equiv 0$ or $1 \pmod 4$.

5. Determine whether the integers in each of these sets are pairwise relatively prime.
a) 21, 34, 55
b) 14, 17, 85
c) 25, 41, 49, 64
d) 17, 18, 19, 23

6. What are the **gcd** and **lcm** of these pairs of integers?
a) $2^2 \cdot 3^3 \cdot 5^5$, $2^5 \cdot 3^3 \cdot 5^2$
c) 17, 17^{17}
d) $2^2 \cdot 7$, $5^3 \cdot 13$
e) 0, 5

7. If the product of two integers is $2^7 3^8 5^2 7^{11}$ and their gcd is $2^3 3^4 5$, what is their lcm?

8. Find the prime factorization of 909090?

9. Use the extended Euclidean algorithm to express gcd(252, 356) as a linear combination of 252 and 356.