Problem 1. The greatest common divisor of two integers a and b is the largest integer d such that $d|a$ and $d|b$.

What is the greatest common divisor of 12 and 18?

A) 0 B) 1 C) 6 D) 12 E) 18

Problem 2. What is the greatest common divisor of 12 and 0?

A) 0 B) 1 C) 6 D) 12 E) Does not exist

Problem 3. What is the greatest common divisor of 12 and 12?

A) 0 B) 1 C) 12 D) Does not exist

Problem 4. What is the greatest common divisor of 0 and 0?

A) 0 B) 1 C) ∞ D) Does not exist

Problem 5. Prove that every rational number can be written a/b where a and b are integers with no greatest common divisor 1.

Problem 6. Prove that every integer > 1 is divisible by some prime number.

Problem 7. Prove that every positive integer can be written as a product of prime numbers.

Problem 8. Prove that there are infinitely many prime numbers.

Problem 9. Prove that if a and b are positive integers with no divisors in common then there are integers x and y such that $ax + by = 1$.

Problem 10. Let a and b be integers and let d be their greatest common divisor. Prove that it is possible to solve the equation $d = ax + by$ for integers x and y.

Problem 11. Let p be a prime number and let a and b be integers. Prove that if p divides ab then p divides a or p divides b.