

Problem 5. Are the following two numbers prime?

113 143

Checking 113: $2 \nmid 113$ and $3 \nmid 113$ and $5 \nmid 113$ and $7 \nmid 113$. We don't need to check with larger primes (11, 13, ...) because these are greater than $\sqrt{113}$. Therefore, 113 is prime.

Checking 143: $2 \nmid 143$ and $3 \nmid 143$ and $5 \nmid 143$ and $7 \nmid 143$ but $11 \mid 143$ ($143=11 \times 13$). Therefore 143 is not prime.

Problem 6. Which of the following numbers are NOT relatively prime to 15?

7 3 5 13 10

3, 5, and 10.

Problem 7. Find the prime factorization of 228.

$$228 = 2 \cdot 114 = 2^2 \cdot 57 = 2^2 \cdot 3 \cdot 19$$

Problem 8. Determine the GCD of 1370 and 2590 (Euclid's algorithm suggested) and then express it as a linear combination of these numbers (i.e., find Bezout's coefficients).

$$2590 = 1 \cdot 1370 + 1220 \quad \text{so} \quad \gcd(2590, 1370) = \gcd(1370, 1220)$$

$$1370 = 1 \cdot 1220 + 150 \quad \text{so} \quad \quad \quad = \gcd(1220, 150)$$

$$1220 = 8 \cdot 150 + 20 \quad \text{so} \quad \quad \quad = \gcd(150, 20)$$

We can continue for one or two more steps, but it's already easy to say that the GCD (of 150 and 20, and therefore 2590 and 1370) is 10.