1. Let \( a = 2655.271 \), \( b = 1836.253 \)
   a) Use the Euclidean Algorithm to compute \( d = \gcd(a, b) \). (3 pt)
   b) Find integers \( x \) and \( y \) such that \( ax + by = d \). (2 pt)
   c) Find all solutions in integers to \( ax + by = d \). (1 pt)

2. Let \( a = 175 \), \( b = 147 \), \( c = 189 \)
   Compute \( d = \gcd(a, b, c) \) then find integers \( x, y, z \) such that \( ax + by + cz = d \). (5 pt)

3. Recall \( \pi(x) \) is the number of primes \( \leq x \).
   a) Use Inclusion-Exclusion to find \( \pi(100) \). (3 pt)
   b) Use the Sieve of Eratosthenes to check your answer. (2 pt)

4. a) Let \( a, b \in \mathbb{P} \). Let \( d = \gcd(a, b) \) and let \( a = da', b = db' \). Show that \( (a', b') = 1 \). (3 pt)
   b) Let \( a, b, c \in \mathbb{P} \) show that:
      \[ \gcd(ca, cb) = c \gcd(a, b) \] (3 pt)
   c) Let \( a, b \in \mathbb{P} \), show that
      \[ \text{lcm}(a, b), \gcd(a, b) = ab \]. (3 pt)