1) (16 points) Using definitions and theorems we proved in class Prove or Disprove:
There are infinitely many composite numbers.

2) (16 points) Find \( d = (6879, 5328) \) and find all the integer solutions \( x, y \) to
\[
6879x + 5328y = d
\]

3) (16 points) Find the prime factorization of 24737. Explain why each factor is prime.

4) (16 points) Suppose \( d = (a, b) \), let \( L = ab/d \). Show
   a) \( a|L \) and \( b|L \).
   b) Use the property that if \( d = (a, b) \) then \( d = ax + by \) for some \( x, y \) to show if \( a|M \) and \( b|M \) then \( L|M \).

   **Note:** \( L \) is called the least common multiple of \( a \) and \( b \).

5) (16 points) Show there are no prime triplets, \( p, p + 2, p + 4 \) all prime other than 3, 5, 7.

6) (16 points) Show \( 2n^3 + 3n^2 + n \) is divisible by 6 for every positive integer \( n \).

   **Note:** In the computational problems, especially 2), you should check your work carefully since partial credit will be based on correct work only up to your first error.