Math 342, Summer 2026, Dr. Honigs
Assignment 1

Instructions: Write up all answers neatly and submit them on **Crowdmark** before the deadline.

You may use the fact that all positive integers can be written uniquely as a product of primes.

1. Find the greatest common divisor d of 407 and 126 and integers x and y which satisfy $407x + 126y = d$.

2. Prove that if n is odd, then $n^2 - 1$ is divisible by 8.

3. Prove that if a and b are positive integers satisfying $(a, b) = [a, b]$ (i.e. gcd=lcm), then $a = b$.

4. Find all solutions to the equation $3^\alpha - 3^\beta = 3$ where α, β are positive integers (or show there are none).

5. Find all solutions where x and y are integers to the Diophantine equation:

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{5}$$