Math 4362 - Number Theory
Homework 2
Due in Class - Thursday 12 September 2019

1. Use the Euclidean Algorithm to find $\gcd(a,b)$, and to obtain integers x and y such that $\gcd(a,b) = ax + by$, in the following cases:

(a) $a = 24$, $b = 138$.

(b) $a = 119$, $b = 272$.

(c) $a = 1769$, $b = 2378$.

2. If p is a prime and $p \mid a^n$ for some positive integer n, prove that $p^n \mid a^n$.

3. Find the prime factorization of each of the following numbers:

(a) 288

(b) 14520

(c) 21357

4. Using your results from Q3:

(a) Write down all the divisors of 288; and

(b) Calculate $\gcd(288, 14520)$ and $\text{lcm}(288, 14520)$.

5. Let a and b be non-zero integers. When is $\gcd(a,b) = \text{lcm}(a,b)$?