
Math 4362 - Number Theory
Homework 5
Due in Class - Thursday October 18, 2018

1. Calculate
 - (a) $\phi(5040)$; and
 - (b) $\phi(3456)$.

2. Prove that
 - (a) If $d \mid n$, then $\phi(d) \mid \phi(n)$;
 - (b) If n is odd, then $\phi(2n) = \phi(n)$; and
 - (c) If n is even, then $\phi(2n) = 2\phi(n)$.

3. Find all solutions of $\phi(n) = 24$.

4. For positive integers m and n prove that
 - (a) $\phi(m)\phi(n) = \phi(mn)\phi(d)/d$, where $d = \gcd(m, n)$
 - (b) $\phi(m)\phi(n) = \phi(\gcd(m, n))\phi(\text{lcm}(m, n))$.

5. Use Euler's Theorem to
 - (a) evaluate 2^{100000} modulo 77; and
 - (b) find the units digit of 3^{100} .