

Worksheet 4.3

Max's Lecture
MATH 55

July 5, 2019

- Exercise A (from charles).**
1. Express 74 in base 2. Express 27 in hexadecimal.
 2. Convert the binary number 10101 to base 4. Do the same for base 8. Can you guess a pattern?

Exercise B. Suppose that an integer is expressed in the standard decimal notation. How can you tell whether the number is divisible by 3? Why does your rule work?

Exercise C. Determine whether 101 is a prime number.

Exercise D. Suppose you know the prime factorizations of two positive integers a and b . How can you find their gcd and their lcm. What is the product of $\gcd(a, b)$ and $\text{lcm}(a, b)$?

Exercise E. Compute the gcd of 54 and 114 using the euclidean algorithm.

Exercise F. Use lemma 2 to prove the following, where a, b, c, m are positive integers and p is a prime:

1. If $p|ab$, then p must divide a or b .
2. If $ac \equiv bc \pmod{m}$ and $\gcd(c, m) = 1$, then $a \equiv b \pmod{m}$