

Homework 3: Number systems, Part I

MAT115, Spring 2009: due 2/16

February 18, 2009

1. Write the following numbers in base 8:

a. $512_{10} = (1000)$

b. $513_{10} = (1001)$

c. $520_{10} = (1010)$

d. $576_{10} = (1100)$

2. a. Write 4237_{10} in binary. (1 0 0 0 0 1 0 0 0 1 1 0 1)

b. How about 4237_{10} in base 16 (hexidecimal)? (1 0 8 D)

c. How do you go backwards? For example, what's 4237_8 in base 6?

$$4237_8 = 2207_{10} = 14115_6$$

d. Show how to add 147 and 173 (both numbers expressed in base 8).

by changing to base 10, we get

$$103 + 123 = 226 = 342_{10}$$

3. How do you decide if 4237 is prime? Is it?

We only need to check primes up to the square root of 4237: $\sqrt{4237} \approx 65.1$

$$4237 = 19 \cdot 223$$

4. Is 4237 divisible by 37? Use the Division Algorithm (p. 66) to express $m = 4237$ as a sum of multiples of $m = 37$ and a remainder r .

$$4237 = 37 \cdot 114 + 19$$

5. On this homework's due date bring one thing to class from nature that illustrates Fibonacci numbers.