

Math 40520 Theory of Number

Homework 3

Due Wednesday, 9/09

Do 5.

1. Exercise 2.9 on page 45 in the textbook.
2. Exercise 2.13 on page 46 in the textbook.
3. Exercise 2.14 on page 46 in the textbook.
4. Exercise 2.17 on page 46 in the textbook.
5. Exercise 2.31 on page 47 in the textbook.
6. Let $n > 1$ and a be integers. Show that there exists an integer $m > 0$ such that $a^m \equiv 1 \pmod{n}$ if and only if $(a, n) = 1$.
7. Do there exist integers n such that $\varphi(n) = 14$?
8. For what integers n does $\varphi(n)$ divide n ?
9. Write a program that takes a fraction $\frac{m}{n}$ and writes it in base b in the form $D_a \dots D_1.E_b \dots E_1 \overline{F_c \dots F_1}_{(b)}$. You are encouraged to use Sage where you can factor into primes and compute multiplicative orders easily. Note that Sage writes integers in base b easily using the command `x.str(base=b)`.