Teoria dos números e corpos finitos

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1. (4.6) For each of the following equations, find an integer x that satisfies the equation.

a. $5x \equiv 4 \pmod{3}$

$$x = 2$$
$$5 \times 2 = 10$$
$$10 - 4 = 6 = 3 \times 2$$

b. $7x \equiv 6 \pmod{5}$

$$x = 3$$
$$7 \times 3 = 21$$
$$21 - 6 = 15 = 5 \times 3$$

c. $9x \equiv 8 \pmod{7}$

$$x = 4$$
$$9 \times 4 = 36$$
$$36 - 8 = 28 = 7 \times 4$$

2. (4.7) In this text, we assume that the modulus is a positive integer. But the definition of the expression $a \mod n$ also makes perfect sense if n is negative. Determine the following:

Usando $a \mod n = a - \lfloor a/n \rfloor \times n$.

a. $5 \mod 3$

$$2$$

b. $5 \quad mod \quad -3$

$$5 - \lfloor 5/-3 \rfloor \times -3$$
$$5 - (-2 \times -3)$$
$$5 - 6$$
$$-1$$

c. $-5 \quad mod \quad 3$

$$-5 - \lfloor -5/3 \rfloor \times 3$$
$$-5 - (-2 \times 3)$$
$$-5 + 6$$
$$1$$

d. $-5 \quad mod \quad -3$

$$-5 - \lfloor -5/-3 \rfloor \times -3$$
$$-5 - (1 \times -3)$$
$$-5 + 3$$
$$-2$$

3. (4.8) A modulus of 0 does not fit the definition but is defined by convention as follows: $a \quad mod \quad 0 = a$. With this definition in mind, what does the following expression mean: $a \equiv b \pmod{0}$?

Significa que a e b são iguais.