-5	0	5
-4	1	6
-3	2	7
-2	3	8
-1	4	9

$0 \pmod 5 = 5 \pmod 5$

$a \equiv b \pmod 5$

$-2 \equiv 3 \pmod 5$

$149 \equiv 39 \equiv 6 \pmod{11}$

$(a_1 \equiv b_1) \times b_2$

$a_1 \cdot a_2 \equiv a_1 \cdot b_2 \equiv b_1 \cdot b_2$

$a_1 \times (a_2 \equiv b_2)$

$2 \cdot 0 \equiv 2 \cdot 2 \pmod 4$

~~$\not\equiv$~~ $0 \equiv 2 \pmod 4$

$m \mid 4a - 4b = 4(a-b)$ & $(m, 4) = ?$

$\Rightarrow m \mid a - b$

$m_1 \mid a-b$, $m_2 \mid a-b \iff [m_1, m_2] \mid a-b$

$a \equiv ? \pmod{25}$ $a \equiv ? \pmod 4 \iff a \equiv ? \pmod{100}$

$100 = 2^2 \cdot 5^2$

$m \mid a-b \iff k \cdot m \mid k \cdot (a-b)$

a dává zb. 1 po dělení m

b 1 m

$\Rightarrow a \cdot b$. 1 m

$a \equiv 2 \pmod 3$, $b \equiv 2 \pmod 3 \Rightarrow a \cdot b \equiv 2 \cdot 2 \equiv 1 \ (3)$

$5^{20} \equiv ?$ (26)

$5^2 = 25 \equiv -1$

$5^{20} \equiv (5^2)^{10} \equiv (-1)^{10} \equiv 1$

$a \equiv 0 \pmod m$

$\Leftrightarrow$

$m \mid a$

$(a+b)^2 \equiv a^2 + 2ab + b^2 = a^2 + b^2 \pmod 2$

$(a+b)^3 \equiv a^3 + 3a^2b + 3ab^2 + b^3 \equiv a^3 + b^3 \pmod 3$

$(a+b)^p \equiv a^p + \cdots + \binom{p}{k} a^{p-k} b^k + \cdots + b^p \pmod p$

$\binom{p}{k} \equiv 0 \pmod p$

$\frac{p \cdot (p-1) \cdots (p-k+1)}{k \cdot (k-1) \cdots 1}$

$39 \cdot \underbrace{(1/39)}_{x} \equiv 1 \pmod{47}$

x ... neso 39^{-1}

47	39	
1	0	47
0	1	39
1	-1	8
-4	5	7
5	-6	1

$5 \cdot 47 - 6 \cdot 39 = 1$

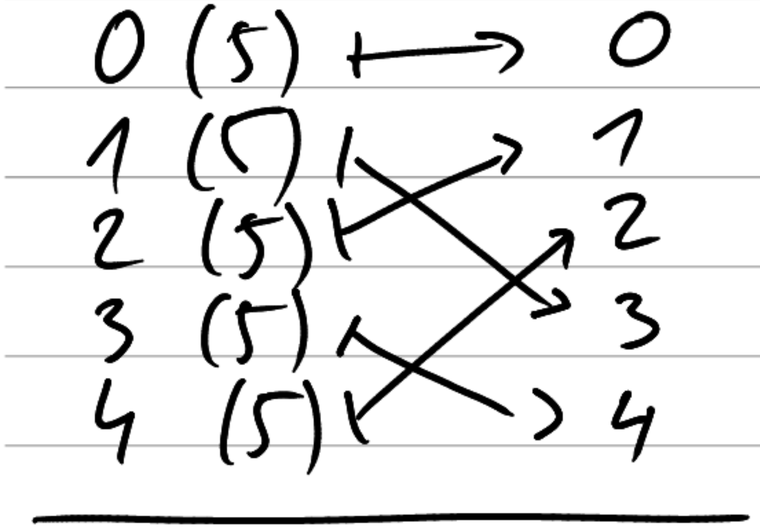
$5 \cdot 47 - 6 \cdot 39 \equiv 1 \pmod{47}$

$\parallel$

0

tj. $-6 \cdot 39 \equiv 1 \pmod{47}$

$\Rightarrow \quad 39^{-1} \equiv -6 \pmod{47}$


0 (5) ⟼ 0
1 (5) 1
2 (5) 2
3 (5) 3
4 (5) 4

$39x \equiv 41 \pmod{47}$

$47x \equiv 0 \pmod{47}$

$39x \equiv 41$

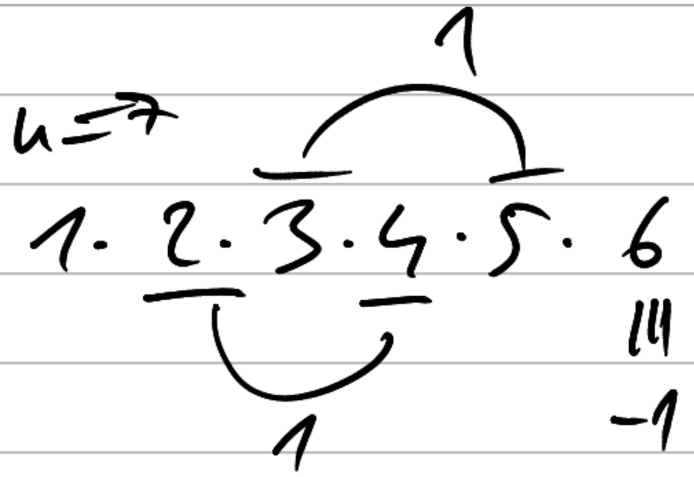
$8x \equiv -41 \equiv 6$

$7x \equiv 17$

$x \equiv -11 \equiv 36$

$n = a \cdot b \quad \Rightarrow \quad (n-1)! = \dots a \dots b \dots$

$\equiv 0 \pmod{n}$



$1^{-1} \equiv 1$

$2 \equiv 4$

$3 \equiv 5$

$4 \equiv 2$

$5 \equiv 3$

$6^{-1} \equiv 6$

$4x \equiv 1 \quad (8)$

$8x \equiv 0$

$4x \equiv 1$

$0x \equiv -2$ X

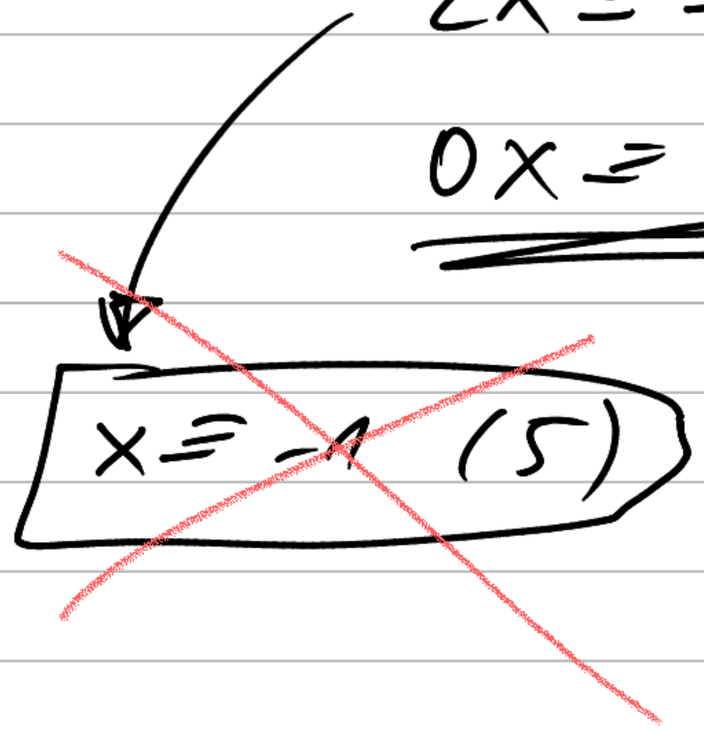
$4x \equiv 1 \quad (10)$

$10x \equiv 0$

$4x \equiv 1$

$2x \equiv -2 \quad (10)$

$0x \equiv 5$ X



$x \equiv 1 \quad (6)$

$x \equiv 2 \quad (8)$

$(m_1, m_2) = 1, \quad m = m_1 \cdot m_2$

$c \pmod m \longmapsto (c \pmod{m_1}, c \pmod{m_2})$

je to bijekce: stačí injektivita

$c(m) \longmapsto c(m_1) \quad c(m_2)$

$\| \qquad \|$

$c'(m) \longmapsto c'(m_1) \quad c'(m_2)$

$x \equiv 1 \quad (10) \iff x = 10t + 1$

$x \equiv 5 \quad (18)$ ← ① $x = 10(9s+4)+1$

$= 90s + 41$

$x \equiv -4 \quad (25)$ ← ②

$x = 90(5r+2)+41 = 450r+221$

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① $10t+1 \equiv 5 \quad (18)$

$18t \equiv 0$

$10t \equiv 4$

$8t \equiv -4$

$2t \equiv 8$ ⟶ $t \equiv 4 \quad (9) \iff t = 9s+4$

$0t \equiv -36 \equiv 0$ ✓

② $90s+41 \equiv -4 \quad (25)$

$25s \equiv 0$

$15s \equiv 5$

$10s \equiv -5$

$5s \equiv 10$ ⟶ $s \equiv 2 \quad (5) \iff s = 5r+2$

$0s \equiv -25 \equiv 0$ ✓

ŘEŠENÍ: $\boxed{x \equiv 221 \quad (450)}$