Th 10/22

Solve the following congruence

$$3x \equiv 4 \pmod 7$$

relatively prime

(1) Find the inverse of 3 mod 7

$3 \times 1 = 3$	$3 \bmod 7 = 3$
$3 \times 2 = 6$	$6 \bmod 7 = 6$
$3 \times 3 = 9$	$9 \bmod 7 = 2$
$3 \times 4 = 12$	$12 \bmod 7 = 5$
$3 \times 5 = 15$	$15 \bmod 7 = 1$!!

(2) Multiply both sides of the equation by the inverse

$$3 * 5 \, x \equiv 4 * 5 \pmod 7$$

$\equiv 1 \bmod 7$

can simplify

$$x \equiv 20 \pmod 7$$

$20 \bmod 7 = 6$

$$x \equiv 6 \pmod 7$$

Solution: all integers that are congruent with 6 (mod 7)

... -22, -15, -8, -1, 6, 13, 20, 27 ...

↑