CS: 2210 Quiz #7 Name______________________

8 points.

To get credit you must show your work on all exercises.

1) Find is a solution to the congruence $3\ x \equiv 5 \pmod 7$

2) Use the **Chinese remainder** theorem to solve the following system of congruencies:

$$x \equiv 0 \pmod 5$$
$$x \equiv 1 \pmod 3$$

ANSWERS

1) Find is a solution to the congruence 3 x ≡ 5 (mod 7)

Inverse of 3 mod 7 is 5

Therefore x ≡ 25 (mod 7)

x ≡ 4 (mod 7)

olution: all integers x congruent with 4 (mod 7)

2) Use the Chinese remainder theorem to solve the following system of congruencies:

$x \equiv 0 \pmod 5$

$x \equiv 1 \pmod 3$

We are asked to solve $x \equiv 0 \pmod 5$ and $x \equiv 1 \pmod 3$. We know from the Chinese remainder theorem that there is a unique answer modulo 15.

$x \equiv 0 \pmod 5$

$x \equiv 1 \pmod 3$

a's

$m = 5 \cdot 3 \equiv 15$

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$M_1 = m/5 = 3$

$M_2 = m/3 = 5$

Find inverses

$M_1(?) \equiv 1 \pmod 5$

$M_2(?) \equiv 1 \pmod 3$

$3 \cdot (2) \equiv 1 \pmod 5$

$5 \cdot (2) \equiv 1 \pmod 3$

y's

$x \equiv 0 \cdot 3 \cdot 2 + 1 \cdot 5 \cdot 2$

$a_1 M_1 y_1 + a_2 M_2 y_2$

$x \equiv 10 \pmod{15}$

all integers congruent with 10 (mod 15)