Homework 9 (due Monday 11/6) , Math 326, Fall 2017

1. Solve (if possible) the system of congruences:

$$7x \equiv 3 \bmod 4$$

$$5x \equiv 1 \bmod 9$$

2. Solve (if possible) the system of congruences

$$7x \equiv 3 \bmod 4$$

$$3x \equiv 1 \bmod 10$$

3. Exercise 8, p.261 (Childs)
4. Exercise 11, p.262 (Childs)
5. Suppose that

$$x \equiv a_1 \bmod \mathrm{m_1}$$

$$\dots$$

$$x \equiv a_k \bmod \mathrm{m_k}$$

is consistent. Show that there is a unique solution modulo $[m_1, ..., m_k]$ (the lcm of m_1,...,m_k).

Extra Credit: Show that the group

$$(\mathbb{Z}/m\mathbb{Z} \times \mathbb{Z}/n\mathbb{Z}, +)$$

is cyclic if and only if $(m, n) = 1$.