HW 1

1) If n_1 and n_2 are prime meaning the greatest common denominator of n_1 and n_2 is equal to 1

$f(x) = (0, 0)$ where X is divisible by n_1 and n_2
since we know n_1 and n_2 are prime,
then n_1 and n_2 multiplied by each other makes
n_1 and n_2 multiples. With that, we know
that $0 \leq x < n_1 n_2$. And based on on our
proof we know that $x = 0$. $0 \leq 0 < (0)(0)$ ✓

2) $\frac{1}{2}_{\times 3} + \frac{1}{3}_{\times 2} + \frac{1}{5}$ $\quad \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$ $\quad \frac{5}{6}_{5\times} + \frac{1}{5 \times 6}$

$$\frac{25}{30} + \frac{6}{30} = \frac{31}{30} \qquad X = \frac{31}{30} \quad ceil(31/30) = 2$$

$$EF(30/31) = \frac{1}{2} + EF\left(30/31 - \frac{1}{2}\right)$$

$$= \frac{29}{62} \quad ceil\left(\frac{62}{29}\right) = 3$$

$$EF(30/31) = \frac{1}{2} + \frac{1}{3} + EF\left(\frac{29}{62} - \frac{1}{3}\right)$$

$$\frac{25}{186} \quad ceil\left(\frac{186}{25}\right) = 8$$

$$EF(30/31) = \frac{1}{2} + \frac{1}{3} + \frac{1}{8} + EF\left(\frac{25}{186} - \frac{1}{8}\right)$$

$$\frac{7}{744} \quad ceil\left(\frac{744}{7}\right) = 107$$

$$EF\left(\frac{30}{31}\right) = \frac{1}{2} + \frac{1}{3} + \frac{1}{8} + \frac{1}{107} + EF\left(\frac{7}{744} - \frac{1}{107}\right)$$

$$\frac{5}{79608} \quad ceil\left(\frac{79608}{5}\right) =$$

$$= 15922$$

$$EF\left(\frac{30}{31}\right) = \frac{1}{2} + \frac{1}{3} + \frac{1}{8} + \frac{1}{107} + \frac{1}{15922} + EF\left(\frac{5}{79608} - \frac{1}{15922}\right)$$

$$EF\left(\frac{30}{31}\right) = \frac{1}{2} + \frac{1}{3} + \frac{1}{8} + \frac{1}{107} + \frac{1}{15922} + \frac{1}{633759288}$$

The Egyptians fractions we had initially is better as the new ones are too tedious and seems impossible to divide among people

3) a) $f(x) = (2 \pmod 3, \ 6 \pmod 7)$

2, 5, 8, 11, 14, 17, 20   6, 13, 20

Ans = $\boxed{20}$

b) $f(x) = (1 \pmod 3, \ 4 \pmod 7)$

1, 4   4, 11, 18

Ans = $\boxed{4}$

c) $f(x) = (0 \pmod 3, \ 2 \pmod 7)$

0, 3, 6, 9   2, 9

Ans = $\boxed{9}$