Quin Buob
HW 1

1) If a and b are integers there exists a value n which $a \leq n \leq b$.
If n_1 and n_2 do not share any common factors then you can map

$$f: [0, n_1 n_2 - 1] \text{ to } [0, n_1 - 1] \times [0, n_2 - 1]$$

Which can be defined

$$f(x) = (x \bmod n_1, x \bmod n_2)$$

is a one-to-one mapping

If $f(x) = (0,0)$ then x can be devisible by both n_1 and n_2, and because they don't share any common factors, x must be a multiple of $n_1 n_2$.
Since this is true x must be greater than or equal to 0 and strictly less than $n_1 n_2$, and since both n_1 and n_2 are equal to zero, via the squeeze theorem $x = 0$.

From above if $f(x_1) = f(x_2)$ then $f(x_1 - x_2) = (0,0)$ but as we see from above the only way for $f(x) = 0$ x must be zero, so this means

$$x_1 - x_2 = 0 \Rightarrow x_1 = x_2$$

This means that any value of x has a unique $f(x)$

2) $\frac{1}{2} + \frac{1}{3} + \frac{1}{5} = \frac{15+10+6}{30} = \frac{31}{30}$

$X = \frac{31}{30} \Rightarrow 1/X = 30/31 \quad ceil(30/31) = 1$

$X = 1 + EF(31/30 - 1) = 1 + EF(1/30) =$ [illegible]

$(\frac{1}{30})^{-1} = \frac{30}{1} \quad ceil(30/1) = 30$

$\Rightarrow X = \frac{1}{2} + \frac{1}{3} + \frac{1}{5} = \frac{31}{30} = \boxed{\frac{1}{1} + \frac{1}{30}}$

3) a) utilizing the chart on the handout and the process of elimination: 20

b) 25 by the same process as (a)

c) 9 by the same process as (a)

Quin Bubb

Sumanary HW1: The Ancient Orient (pg 13-23)

During 5th, 4th + 3rd millenium of BC ther were large advances in societies the neolithic communities that arose within the river valleys. This primarily occured in Africa along the Nile and Asia along the Tigris and Euphrates. This land, once flooding was learned to be managed, was very fertile and good for agriculture. Due to the flooding, engineering feats like Levees, Dams, canals + reservoirs had been developed so as to allow for large scale agriculture. Due to these large sable projects many localities had to work together in order to construct and manage them, leading to the establishments of quasi-government. These governing administrations were usually localized to urban centers. Because of all these developments, the standard of living rose ~~th~~ along with agricultural surplus. It also led to the creation of aristocracies and chieftains, and the jump in non-survial base carreers like artisans, soldiers, and priests. The administration of the government led to permanent grup of wise individuals who knew about science and technology. It also gave rise to rudamentay laws ~~and~~ to manage these infrastructures. It also caused technical knowledge to grow amongst the bureaucrats and artisan communities. A social hierarchy also began to develop, and fuedalistic communities and eventual local

Kingdoms arose, leading to lots of conflict and kingdoms under a single monarch.

The relative prosperity of these river valley kingdoms also led to conflict ~~under~~ w/ mountain and desert tribes and there ultimate collapse. This cycle of rise and fall occured over and over again. With the creation of religions, Priests became largely involved in the governing bodies and were carriers of scientific knowledge.

The creation of oriental math was due to ~~the~~ practical needs of a calendar, and tax collections, and other aspects of society. But Science eventually evolved into the more abstract in order to figure out the secrets of the natural world. Basic Arithmetic evolved to algebra and mensuration became geometry with the development of scribe schools. Many of these communities were largely closed off from one another so the culture evolved independently but there scientific structure was similar, and many local discoveries did not spread out of the community. This made it hard to understad historically because unline there Egypt & mesopotamia, they used bamboo to transcribe there discovery which are perishaple and were not perserved.

The understanding of Egyptian math arose for 2 papyri with math problems on them. They had a decimal based system ~~whi~~ with primarily additive characters, with the goal of reducing all multiplication to repeated addition and created dyadic multiphication. Egypt also began to develop the concept of fractions. They would express all fractions as

the sum of unit fractions, and then they had a table of for fractions of $2/n$. This combined w/ dyadic multiplication allowed them to express everything as additive fractions. Unfortunately, the complexity of this impeded an further developments of math and science.

Egyptians, also, had an idea of geometric progression. They were able to develop the formula for the area of a triangle as well as that of a circle, and the frustum of a square pyramid. Many people attribute of mathematical feats to the egyptians but it is not actually the case.