

Homework # 10

9.8

9.8.6)

A.) Since

$$c = (m+k) \bmod N \quad \& \quad m = (c-k) \bmod N$$

$$\text{Using } N=4657, c=1322, k=3411,$$

$$1322 = (3411 + k) \bmod 4657$$

$$3411 = (1322 + k) \bmod 4657$$

$$k = 4657 - 2089$$

$$k = -4657 + 2089$$

$$\therefore \text{Using } p=1 \& q=-1, \quad \boxed{k = 2568}$$

10.12

10.12.1)

$$A.) 50! \cdot C_{8-1} = 57! = \frac{57!}{7!(57-7)!} = 264585836$$

$$B.) ((57! - 8) \cdot (36! + 28) \cdot (15!)) = 1.4202145 \cdot 19$$

11.3

11.3.2)

A.) Using the pigeonhole principle,

$$N = 121.4 \cdot 10^6, \quad k = 1 \text{ mil} - 10000 = 990,000$$

Using PH formula, H of people carrying same

$$\text{Annual inc} = \left\lceil \frac{N}{k} \right\rceil = \left\lceil \frac{121.4 \cdot 10^6}{990000} \right\rceil = \boxed{123}$$

B.) Using the pigeonhole principle, (assuming 31 days in a month)

$$\hookrightarrow \left\lceil \frac{621}{31} \right\rceil = 21 \therefore 21 \text{ people can be born on same day in a month}$$

$$\hookrightarrow \left\lceil \frac{620}{31} \right\rceil = 20 \therefore 621 + 620 \text{ people as basis (changes}$$

the fact of how many people may

be born on same day (due to circ func)