Homework 2

Zachary Hightower

1. Reading

2. In $\mathbb{Z}_{20}$ calculate the following. If the answer does not exist, say so and explain why.

a. $17 \oplus 8$

$(17+8) \bmod 20$

$(25) \bmod 20 = 5$

b. $3 \ominus 7$

$(3-7) \bmod 20$

$(-4) \bmod 20 = 16$

c. $5 \otimes 9$

$(5 \times 9) \bmod 20$

$(45) \bmod 20 = 5$

d. 3^{-1}

For $k \in \mathbb{Z}_{20}$, $\gcd(20, k)$ when $k = (1, 3, 7, 9, 11, 13, 17, 19)$

$(3 \times 7) \bmod 20$

$(21) \bmod 20 = 1$

So, $3^{-1} = 7$