1/15 Homework 1

2.7 $\{1, 2, 3\}$

$1 \circ 2 = 2 \quad 1 * 2 = 1$

$1 \circ 3 = 3 \quad 1 * 3 = 1$

$A = \{1, 2, 3\}$

$\min(2, x) \neq 3$

$\max(2, x) \neq 1$

hence in any case 2 does not have an inverse

$\{0, 1$

3.7 a) commutative

$a \square b = b \square a$

$2 + 1 \mid 3 = 1 + 2 \mid 3$

$a + b = b + a$

$(a+b) \bmod 3 = (b+a) \bmod 3$

holds

b) Associative

$a \square (b \square c) = (a \square b) \square c$

$a + (b+c) \bmod 3 = (a+b) + c \bmod 3$

$0 + (1+2) \% 0 = (0+1) + 2 \% 3$ holds

c.) Identity → $a \square e = a$ & $e \square a = a$

$(a+b) \bmod 3 = (b+a) \bmod 3$

$(0+1) \bmod 3 = (1+0) \bmod 3$

$1 \bmod 3 = 1 \bmod 3$

holds

d.) Inverse $e \square e^{-1} = a$ & $e^{-1} \square e = a$

$(2 + (-2)) \bmod 3 = (-2 + 2) \bmod 3$

$(1 + (-1)) \bmod 3 = (-1 + 1) \bmod 3$

holds