

CSE 373 ASSIGNMENT 1 SOLUTIONS

1. **a** $2^S = \{\{\}, \{0\}, \{1\}, \{2\}, \{0, 1\}, \{0, 2\}, \{1, 2\}, \{0, 1, 2\}\}$

b RELATION

reflexive	add (c,c)
symmetric	remove (a,b) or add (b,a) remove (a,c) or add (c,a) remove (b,c) or add (c,b)
antisymmetric	property holds
transitive	property holds
partial order	add (c,c)
total order	add(c,c)
function	remove two of: $\{(a,a),(a,b),(a,c)\}$ remove one of: $\{(b,b),(b,c)\}$ add one of: $\{(c,a),(c,b),(c,c)\}$
surjection ¹	remove both of: $\{(a,b),(a,c)\}$ remove (b,c) add (c,c)
injection ²	remove both of: $\{(a,b),(a,c)\}$ remove (b,c) add (c,c)
invertible function ³	remove both of: $\{(a,b),(a,c)\}$ remove (b,c) add (c,c)
partial function	remove both of: $\{(a,b),(a,c)\}$ remove (b,c)

c $S \times W \times W = \{(a,0,0),(a,0,1),(a,1,0),(a,1,1),$
 $(b,0,0),(b,0,1),(b,1,0),(b,1,1),$
 $(c,0,0),(c,0,1),(c,1,0),(c,1,1)\}$

$$(S \times W) \times W = \{((a,0),0),((a,0),1),((a,1),0),((a,1),1),$$

$$((b,0),0),((b,0),1),((b,1),0),((b,1),1),$$

$$((c,0),0),((c,0),1),((c,1),0),((c,1),1)\}$$

¹Not all possible surjections are displayed.

²Not all possible injectionss are displayed.

³Not all possible bijections are displayed.

$$| S \times W \times W - (S \times W) \times W | \neq 0$$

The cartesian product operation (binary or n-way) is not associative.

2. See Assignment 3.