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CSCE 355
Sep 14, 2017
Test One

1) a) $[7] - [4] = \{5,6,7\}$ [n] starts from one

b) $[2] \cup ([7] - [4]) = \{0,1,2\} \cup \{5,6,7\} = \{0,1,2,5,6,7\}$ +14

c) $2^{[7]-[4]} = 2^{\{5,6,7\}} = \{\emptyset, \{5\}, \{6\}, \{7\}, \{5,6\}, \{5,7\}, \{6,7\}, \{5,6,7\}\}$

d) $[2] \times ([7]-[4]) = \{0,1,2\} \times \{5,6,7\} =$

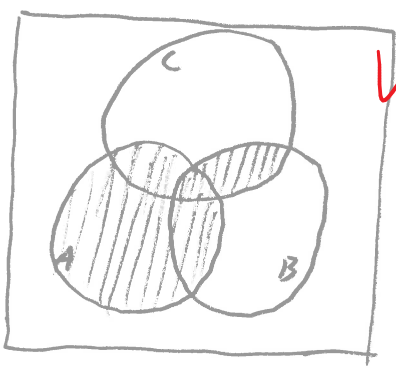
$\{(1,5),(1,6),(1,7),(2,5),(2,6),(2,7),(0,5)(0,6)(0,7)\}$ Consistent.

e) $[5] \,\Delta\, ([7]-[4]) = \{0,1,2,3,4,5\} \,\Delta\, \{5,6,7\} = \{0,1,2,3,4\} \cup \{6,7\}$

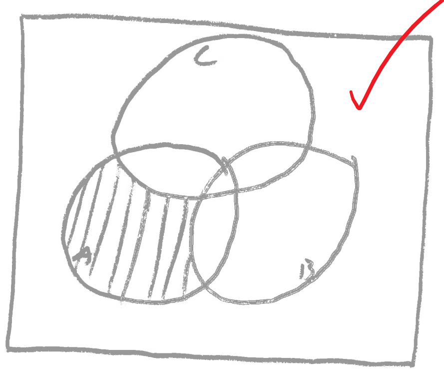
$= \{0,1,2,3,4,6,7\}$ Consistent

42/75

2) a) $A \cup (B \cap C)$

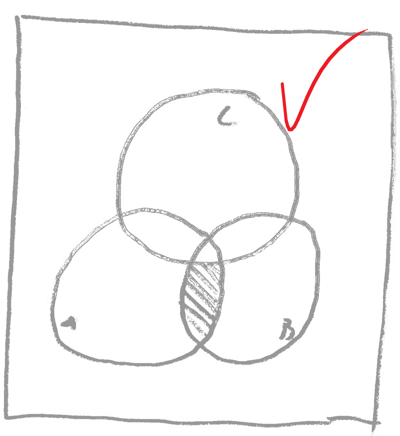


b) $A - (B \cup C)$

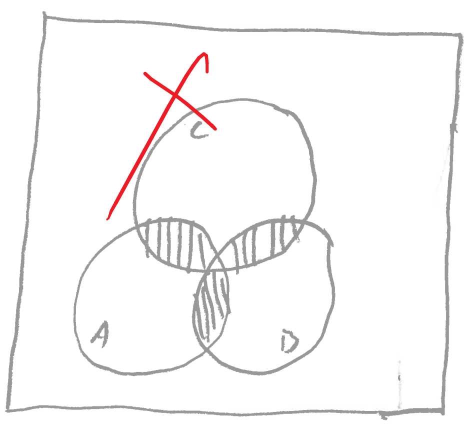


+9

c) $(A \cap B) - C$

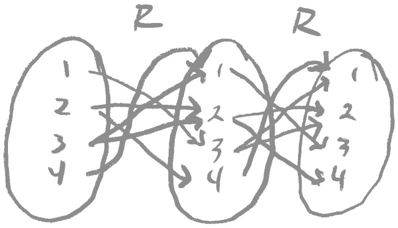


d) $A \,\Delta\, (B \cup C) = (A - (B \cup C)) \cup ((B \cup C) - A)$



3) a) $R \circ R$

$R \circ R = \{ (1,1), (1,2) (2,2), (2,4), (2,1), (3,3) (3,2) (3,4) (4,3) \}$

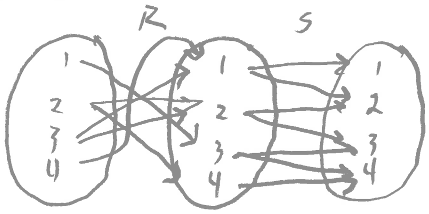


+3

$R \circ S$

$\langle 1,2 \rangle$ $\langle 2,1 \rangle$

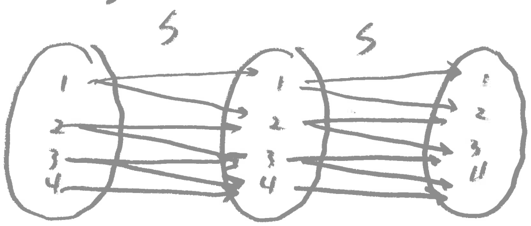
$R \circ S = \{ (1,3), (1,4), (2,2), (\cancel{2,3}) (2,4), (3,1), (3,2), (\cancel{3,3}), (4,1), (4,2) \}$



$S \circ S$

$S \circ S = \{ (1,1), (1,2), (1,3), (2,2), (2,3), (2,4), (3,3) (3,4) (4,4) \}$

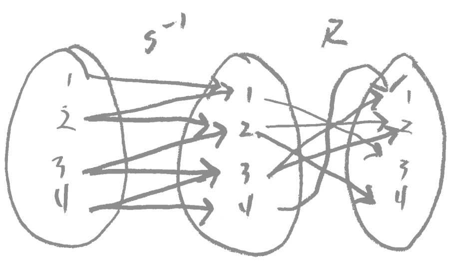
+3



b) $S^{-1} \circ R$

$\langle 1,2 \rangle$

$S^{-1} \circ R = \{ (1,3), (2,3), (2,2), (2,4), (3,2), \cancel{(3,4)}, (3,1), (4,1), \cancel{(4,2)} \}$



+3

c) R is neither symmetric (no (4,2)) or transitive (contains (1,3) and (3,1) but not (1,1).)

d) S is reflexive (has (1,1) (2,2) (3,3) + (4,4)). S is not transitive, (has (1,2) but not (2,1)). +3

4) $|[4]| = 5$ total number of functions: 5^8 consistent

$|[7]| = 8$ one to one functions: ~~$7 \times 6 \times 5 \times 4$~~

6) a) True

b) True +3

c) False, will exclude the null set,

+3

5) $\binom{3}{2}\binom{4}{3} = \frac{3!}{2!(1!)} = \frac{6}{2} = 3$ $3 \times 4 =$ 12 ways to choose

$\frac{4!}{3!(1!)} = \frac{24}{6} = 4$

+15