Discrete Test 3 Review

(1) Do Test 1 Review, then rework Test 1.

(2) Do Test 2 Review, then rework Test 2.

(3) Rework all quizzes, 1-9.

Given sets $A = \{4, 7, 8, 9, 2\}$, $B = \{5, 9, 1\}$

(4) Let $R = \{(7,9), (2,8), (4,5), (2,1)\}$ Is R a relation from A to B? No, $8 \notin B$

(5) Let $R = \{(5,9), (5,5), (1,1), (9,5)\}$ Is R a symmetric relation from B to B? Yes

(6) Let $R = \{(5,9), (5,5), (1,1), (9,5)\}$ Is R a reflexive relation from B to B? No, missing $(9,9)$

(7) Let $R = \{(5,9), (5,5), (1,1), (9,5)\}$ Is R a transitive relation on B? No, missing $(9,9)$

(8) Let $R = \{(5,9), (1,1), (9,5)\}$ Is R a transitive relation on B? No, missing $(5,5)$

(9) Let $R = \{\{(5,1), (1,1), (9,5)\}$ Is R a transitive relation on B? No, missing $(9,1)$

(10) Let $R = \{(7,9), (2,1), (4,5), (2,5)\}$ Is R a function from A to B? No

(11) Let $R = \{(5,9), (1,7), (9,4)\}$ Is R a function from B to A? Yes

(12) Let $R = \{(5,9), (1,7), (9,4)\}$ Is R an onto function from B to A? No

(13) Let $R = \{(5,9), (1,7), (9,4)\}$ Is R a 1-1 function from B to A? Yes

(14) Let $R = \{(5,9), (1,7), (9,4)\}$ Find the range of R. $\{9, 7, 4\}$

Given sets $A = \{4, 7, 8, 9, 2\}$, $B = \{5, 9, 1\}$

(15) Let $f = \{(5, 9), (1, 1), (9, 5)\}$ and $g = \{(5, 1), (1, 1), (9, 5)\}$.

Find the composition $f \circ g$ $\{(5,1), (1,1), (9,9)\}$

(16) Let $f = \{(5, 9), (1, 1), (9, 5)\}$ and $g = \{(5, 1), (1, 1), (9, 5)\}$.

Find the composition $g \circ f$ $\{(5,5), (1,1), (9,1)\}$

(17) Find the number of functions from A to B. 3^5

(18) Find the number of functions from A to A. 5^5

(19) Find the number of functions from B to A. $5^3 = 125$

(20) Find the number of 1-1 functions from A to B. 0

(21) Find the number of 1-1 functions from B to A. ${}_5P_3 = 5 \cdot 4 \cdot 3 = 60$

(22) Find the number of 1-1 functions from A to A. ${}_5P_5 = 5! = 120$

(23) Find the number of relations on B. $2^{3 \cdot 3} = 2^9$

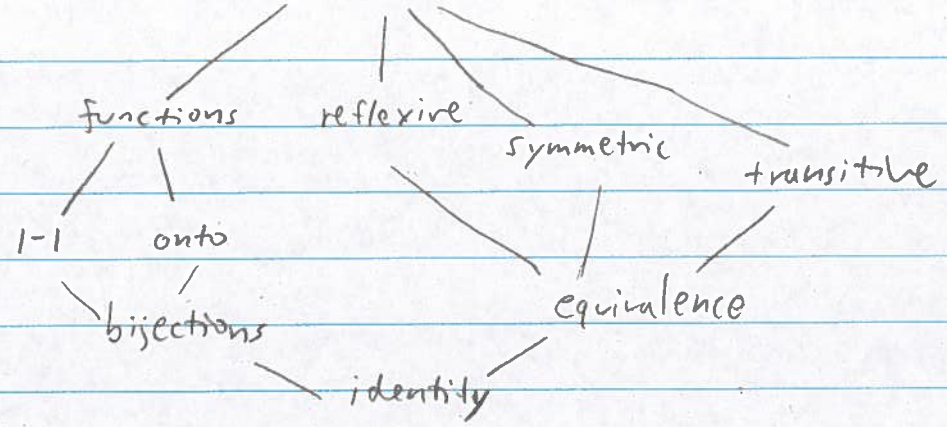
(24) Find the number of symmetric relations on B. $2^{\frac{1}{2} \cdot 3 \cdot 4} = 2^6$

(25) Find the number of reflexive relations on B. $2^{3 \cdot 2} = 2^6$

(26) Find the number of both reflexive and symmetric relations on B. $2^{\frac{1}{2} \cdot 3 \cdot 2} = 2^3$

Test 3 Review List.

→ Definitions: Relations



→ Counting $|A \times B| = |A| \cdot |B|$; $|\mathcal{P}(A)| = 2^{|A|}$

$|\text{Relations } A \text{ to } B| = 2^{|A|(|B|)}$, $|\text{Relations on } A| = 2^{|A|(|A|)}$

$|\text{Reflexive relations on } A| = 2^{|A|(|A|-1)}$

$|\text{Symmetric relations on } A| = 2^{\frac{1}{2}|A|(|A|+1)}$

$|\text{Reflexive and symmetric relations on } A| = 2^{\frac{1}{2}|A|(|A|-1)}$

$|\text{Functions } A \text{ to } B| = |B|^{|A|}$

$|\text{1-1 functions } A \text{ to } B| = \begin{cases} 0, & |A| > |B| \\ {}_{|B|}P_{|A|}, & |A| \leq |B| \end{cases}$

$|\text{bijections } A \text{ to } B| = \begin{cases} 0, & |A| \neq |B| \\ |A|!, & |A| = |B|. \end{cases}$

$|\text{subsets of } A \text{ of size } k| = \binom{|A|}{k} = \frac{{}_{|A|}P_k}{k!}$

How many subsets of $\{0,1,2,3,4,5\}$ of size 4? $\frac{6 \cdot 5 \cdot 4 \cdot 3}{4 \cdot 3 \cdot 2 \cdot 1} = 15$