



PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Second Exam A

DISCRETE STRUCTURES

06-05-2008

Part 1 Each problem is worth 2 points. Circle one answer.

- 1) Suppose that $A \cap B = \emptyset$. Which statement is true?
a) $A - B = \emptyset$ b) $B - A = A - B$ c) $A + B = A - B$ d) $A \cup B = A + B$
- 2) Suppose $|A| = 10$. How many subsets have 8 or 9 elements?
a) 220 b) 165 c) 55 d) 45
- 3) How many different permutations from the set $\{A, M, E, O, S, T\}$ which do not contain the word SET ?
a) 24 b) 696 c) 714 d) 720
- 4) Let $A = \{2,3,5,7\}$. Which relation is transitive?
a) $R = \{(a,b) \mid a \neq b\}$ b) $R = \{(a,b) \mid a + b > 5\}$
c) $R = \{(a,b) \mid a - b > 0\}$ d) $R = \{(a,b) \mid a + b \text{ is odd}\}$
- 5) Let $A = \{1,2,3,4\}$ and $R = \{(a,b) \mid a \bmod b > 1\}$. Find the matrix for R.
a) $\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}$ c) $\begin{bmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ d) $\begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix}$
- 6) Let $A = \{1, 2, 3, 4\}$ and $R = \{(1,2), (2,3), (2,4), (3,1), (4,1)\}$. Find R^{-2} .
a) $\{(1,2), (2,3), (2,4), (3,1), (4,1)\}$
b) $\{(1,3), (1,4), (2,3), (4,2)\}$
c) $\{(1,2), (1,4), (2,3), (3,1), (4,1)\}$
d) $\{(1,3), (2,4), (2,3), (3,1), (4,2)\}$

Part 2 Each problem is worth 4 points. Write complete solution.

- 7) How many positive integers ≤ 1000 which are multiples of 9 or 15 or 20?
- 8) Let $A = \{1,2,3,4\}$. Find an example of $R \subseteq A \times A$ for each below.
a) symmetric, transitive, not reflexive
b) not symmetric, not anti-symmetric, not transitive
c) equivalence relation
d) total order relation

-Amin Witno