PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Discrete Structures (210104)	Paper: Exam 2 Form (A)
Discrete Mathematics (210242)	Date: 9 January 2005
Discrete Mathematics (250151)	Time: 15:00 – 15:50
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PART 1. Each problem is worth 2 points. Circle the right answer.

1. Let A and B be sets. One of these statements is false:
   a) $A \subseteq P(A)$ b) $A \subseteq A \oplus B$ c) $A \subseteq A \cup B$ d) $A - B \subseteq A$

2. There are 8 Faculties at Philadelphia University. What is the minimum number of students in order to have at least 9 of them in the same Faculty?
   a) 63 b) 65 c) 71 d) 73

3. Which matrix represents a relation which is not transitive?
   a) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 0 & 1 & 1 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ d) $\begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 1 & 1 & 0 \end{bmatrix}$

4. Let A = {1, 2, 3, 4, 5} and R = {(a, b) | a + b < 7} be a relation from A to A. Which of the following properties describes R?
   a) reflexive and symmetric
   b) symmetric and transitive
   c) anti-symmetric and transitive
   d) symmetric and not anti-symmetric

5. Let A = {1, 2, 3, 4, 5}. Which of the following is an equivalence relation on A?
   a) R = {(a, b) | a divides b}
   b) R = {(a, b) | a mod 3 = b mod 3}
   c) R = {(a, b) | a mod b = 0}
   d) R = {(a, b) | b mod a = 3}

PART 2. Each problem is worth 5 points. Write complete solutions in this paper.

1. How many positive integers ≤ 300 which are multiples of 3, 4, or 10 ?

2. Let A = {2, 3, 8, 12, 24} and R be a partial order relation from A to A defined by R = {(a, b) | a divides b}. Find the elements of R, then draw the digraph and the Hasse diagram of R.

ANSWERS

1. B
2. B
3. C
4. D
5. B

1. 160
2.