PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Second Exam A **DISCRETE STRUCTURES** **08–05–2011**

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

1) Given R = {(1,3), (2,1), (3,4), (4,3)}. Find R^3.

a) {(1,4), (2,3), (3,4), (4,3)} b) {(1,3), (2,4), (3,4), (4,3)}
c) {(1,4), (2,3), (3,2), (4,1)} d) {(1,2), (2,4), (3,1), (4,3)}

2) Which relation is an equivalence relation?

a) $\begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \end{bmatrix}$

3) How many permutations with A, B, C, D, E which do **not** contain "BAD" ?

a) 114 b) 96 c) 30 d) 24

4) Given |A| = 8. How many subsets have at least 6 elements?

a) 72 b) 56 c) 46 d) 37

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

5) How many positive integers ≤ 1000 are multiples of 16 or 20 or 25?

6) Find the matrix of the transitive closure, given the relation R = $\begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$

7) Given A = { 2, 4, 8, 12, 24 } and R = { (a,b) | b mod a = 0 }.

a) Draw the digraph.
b) Prove that R is a partial order relation.
c) Draw the Hasse diagram.

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-Rahma Al-Daqa