CSIEB0080-Quiz 6
Jan. 14, 2013 14:10 pm ~ 17:00 pm

Instructor: PaoLien Lai
Closed book

Student name:_____ Student number: _____

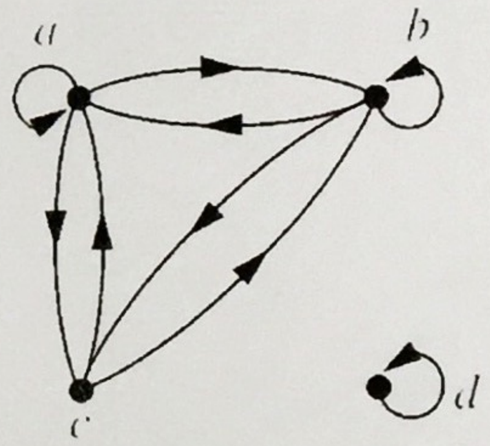
There are 6 questions and 120 marks total. Please write an answer and the detailed calculation to each of the following questions.

1. (30 points) For each of these relations on the set {1, 2, 3, 4}, decide whether it is reflexive, whether it is symmetric, whether it is antisymmetric, and whether it is transitive.
   (a)、 {(1, 1), (2, 2), (2, 3), (2, 4), (3, 2), (3, 3), (3, 4)}
   (b)、 {(1, 2), (2, 1), (2, 2), (3, 3), (4, 4)}
   (c)、 {(2, 4), (4, 2)}
   (d)、 {(1, 2), (2, 3), (3, 4)}
   (e)、 {(1, 1), (2, 2), (3, 3), (4, 4)}
   (f)、 {(1, 3), (1, 4), (2, 3), (2, 4), (3, 1), (3, 4)}
2. (10 points) How many different relations are there from a set with **n** elements to a set with **m** elements?
3. (20 points) Let R be the relation R = {(a, b) | a divides b} on the set of positive integers. Find
   (a)、 R^{-1}.
   (b)、 $\bar{R}$.
4. (20 points) Let R be the relation represented by the matrix $\begin{bmatrix} 0 & 0 & 1 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$

   Find the matrix representing
   (a)、 R^2.
   (b)、 R^3.
5. (25 points) Let R_1 and R_2 be relations on a set A represented by the matrices

$$M_{R_1} = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix} \text{ and } M_{R_2} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

   Find the matrices that represent
   (a)、 $R_1 \cup R_2$.
   (b)、 $R_1 \cap R_2$.
   (c)、 $R_2 \circ R_1$.
   (d)、 $R_1 \circ R_2$.
   (e)、 $R_1 \oplus R_2$.



6. (15 points) List the ordered pairs in the relations represented by the directed graph above.