PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Second Exam **DISCRETE STRUCTURES** **20–12–2005**

Each problem is worth 4 points.

1. Use Euclidean Algorithm to compute GCD(2006, 6002).

2. Count all integers ≤ 300 which are multiples of 3 or 4 or 10.

3. Given R = {(1,2), (2,3), (3,2), (3,4), (4,1), (4,4)}. Find the set
   a) R^2
   b) R^3
   c) $R - R^{-1}$
   d) $R \oplus R^{-1}$

4. Given A = {1, 2, 3, 4}. Find an example of $R \subseteq A \times A$ such that
   a) R is symmetric, transitive, not reflexive.
   b) R is reflexive, symmetric, not transitive.

5. Given A = {1, 2, 3, 4} and two zero-one matrices of $R \subseteq A \times A$.

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

   a) One of them is a partial order. Draw the Hasse diagram.
   b) Another one is an equivalence relation. Find the equivalence classes.