PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Second Exam A **DISCRETE STRUCTURES** **19–12–2011**

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

1) Given A = {1,2,3,4,5}. Which one is an equivalence relation?
a) R = {(x,y) | x + y is even} b) R = {(x,y) | x mod y = 0}
c) R = {(x,y) | x + y is odd} d) R = {(x,y) | y mod x = 0}

2) Which relation is a total order?
a) $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix}$

3) How many permutations with A,B,C,D,E,F contain the word “ACE”?
a) 6 b) 24 c) 120 d) 720

4) How many permutations with A, B, B, C, C, C, C ?
a) 24 b) 60 c) 105 d) 420

5) How many integer solution ≥ 0 of the equation x + y + z = 10 with condition x ≥ 3 and y ≥ 3 ?
a) 15 b) 21 c) 28 d) 36

Part 2 Each problem is worth 5 points. Write complete solution.

6) Given A = {2, 3, 6, 9, 18} and R = {(a,b) | b mod a = 0}.
Why is R a partial order relation? Draw the graph and the Hasse diagram.

7) How many integers from 1 to 200 are multiples of 8 or 9 or 12?

Solution: