PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Final Exam A **DISCRETE STRUCTURES** **14–6–2007**

PART (I) Each problem is worth 3 points. Circle one answer.

1) Convert the proposition $p \rightarrow (q \oplus q)$ to CNF.

a) $(\neg p \vee \neg q) \wedge (p \vee q)$ b) $(\neg p \vee q) \wedge (p \vee \neg q)$
c) $(\neg p \vee \neg q) \wedge (\neg p \vee q)$ d) $(\neg p \vee q) \wedge (p \vee q)$

2) The number 5234 is in octal. Convert it to hexadecimal.

a) A8E b) B9E c) B8C d) A9C

3) The sequence 3,7,6,10,11,15,... is given by the following recursive relation.

a) $f(n)=\left\lfloor \frac{f(n-1)+f(n-2)}{2} \right\rfloor$ b) $f(n)=\left\lfloor \frac{f(n-1)}{2} \right\rfloor + f(n-2)$

c) $f(n)=f(n-1)+\left\lfloor \frac{f(n-2)}{2} \right\rfloor$ d) $f(n)=\left\lfloor \frac{f(n-1)}{2} \right\rfloor + \left\lfloor \frac{f(n-2)}{2} \right\rfloor$

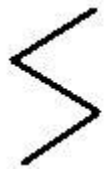
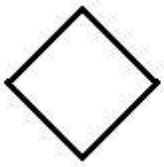
4) One of these sets is equal to A – B.

a) $(A \oplus B) \cap A$ b) $(A \oplus B) \cap B$ c) $(A - B) \oplus A$ d) $(A - B) \oplus B$

5) Find the number of integer solutions to x + y + z = 50 satisfying the conditions $x \geq 5$ and $y \geq 8$ and $z \geq 10$.

a) 406 b) 351 c) 300 d) 253

6) A = {4,8,12,24} and R = {(a,b) | a divides b} $\subseteq$ A x A. The Hasse diagram is

a) 
b) 
c) 
d) 

7) How many permutations from the letters {A, C, E, M, N, S, T} contain the word AN or SET ?

a) 738 b) 234 c) 816 d) 142

8) Which graph has no Euler path/circuit and no Hamilton path/circuit?

a) K2,5 b) K4,4 c) K3,4 d) K3,5

9) Draw the dual graph of this map. 

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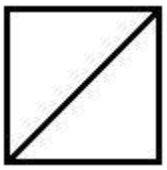
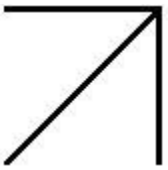
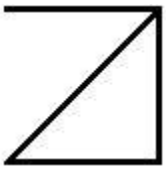
a)  b)  c)  d) 

10) Convert the incidence matrix $\begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$ to adjacency matrix.

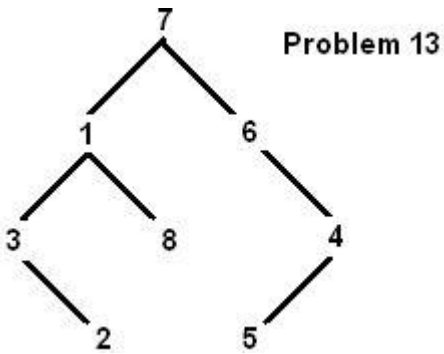
a) $\begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 0 & 2 \\ 1 & 0 & 1 & 0 \\ 1 & 2 & 0 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 1 & 1 & 0 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 2 \\ 1 & 0 & 0 & 1 \\ 1 & 2 & 1 & 0 \end{bmatrix}$ d) $\begin{bmatrix} 0 & 0 & 2 & 0 \\ 0 & 0 & 1 & 1 \\ 2 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}$

PART (II) Each problem is worth 5 points. Write complete solutions.

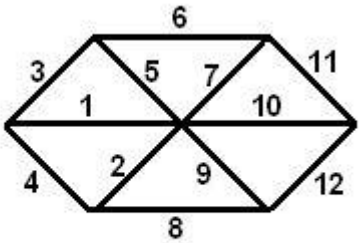
11) Evaluate GCD(2007,522) using Euclidean Algorithm.

12) Find the matrix of the transitive closure of the relation given by $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

13) Write the output using (a) pre-order (b) post-order (c) in-order algorithms.



Problem 13



Problem 14

14) Draw the minimal spanning tree and find its value.

-Amin Witno