Quiz for Discrete Mathematics and Its Application (2024, JUNE 14)

Register No. _____ Name: _____ Score: _____

1. (20 points) Determine whether the following statements are true or false. If it is true write a √ otherwise a × in the blank before the statement.

( ) (1)The set of intervals [k, k+1], k=…,-2, -1,0, 1, 2, …is the partition of the set of all integers.

( ) (2)There are two different equivalence relations on a set with two elements.

( )(3)Let R be a relation on the set A. R equals it's transitive closure if and only if R is transitive.

( )(4) The poset ({1, 2, 3, 4, 6, 8},|) is a lattice, where $x|y$ denotes x divides y..

( )(5) A connected simple planar graph with 5 regions and 8 vertices, each of degree 3.

( ) (6)Every tree is bipartite.

( )(7) The graph $K_{3,3}$ is a Hamilton graph.

( ) (8)A undirected graph which has n vertices and n-1 edges is a tree.

( ) (9)The Hasse diagram for the poset ({1,2,3,4,5,7,8,9 },|) is a 4-ary tree.

( )(10) The graph shown in Fig.1 is planar.

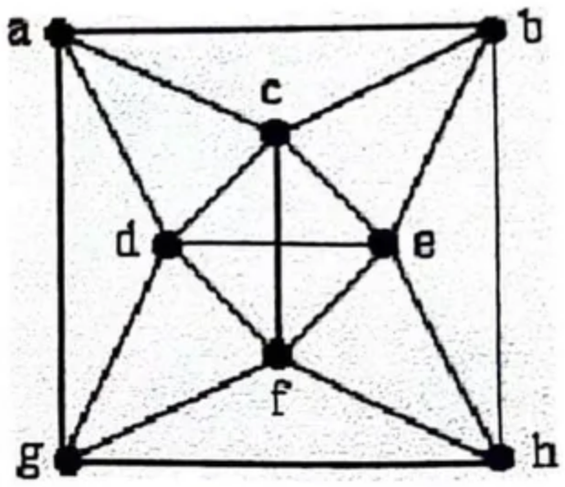


Fig.1

2. (18 points) Fill in the blanks.

(1) Suppose A={1,2}, there are_____relations on the set A, there are_____partial orderings.

(2) Suppose that a full 3-ary tree has 100 internal vertices. it has _____ leaves.

(3)There are _____non-isomorphic rooted trees with 5 vertices.

(4) Give a recurrence relation for e_n = number of edges of the graph Q_n. _____

(5) Find the smallest partial order on {1, 2, 3} that contains (1,1), (3,2), (1,3).

_____

3.(**8 points**) Given the following prefix form for propositional formula f.

$\rightarrow\rightarrow\rightarrow \rightarrow pqqr \rightarrow\rightarrow rp \rightarrow sp$

(1) Build the corresponding binary tree expression tree for f.

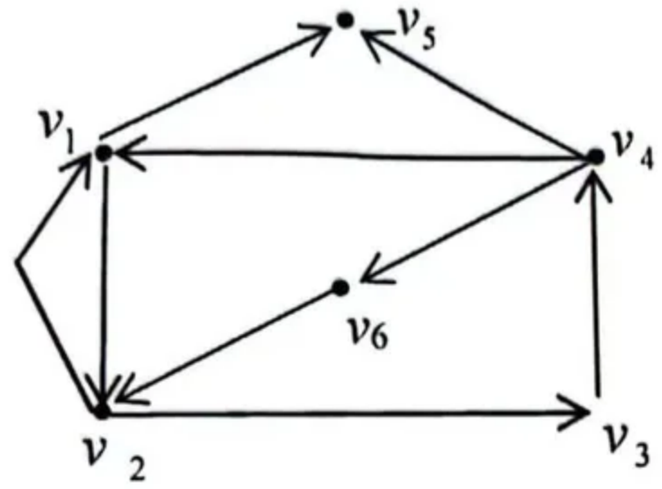
(2) Give the postfix form for f.

4. （**12 points**） G is a directed graph.

(1) Find the number of different paths of length 3.

(2) Determine this directed graph is strong connected or weakly connected.

(3) Use breadth-first search to find a spanning tree for the underlying undirected graph of the directed graph G. Choose V_4 as the root of the spanning tree.



5. **(12points)** Assume the frequencies of letters *A*, *B*, *C*, …, *J* are given by the following table.

number	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
frequency	25	2	4	6	20	15	12	10	5	1

1) Draw a Huffman tree such that the weight of left leaf is less than the right leaf.

2) Write the weight of the tree.

3) Write the prefix code.