2004 학년도 1 학기 기말고사

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[주의] 문제지는 모두 4장, 문제는 모두 9문제임.

1. Let G be a weighted graph with linked representation as follows :

Vertex File

START 5

	1	2	3	4	5	6	7	8	9
VERTEX	D		B	F	A		C	E	G
NEXT-V	8		7	9	3		1	4	0
PTR	9		3	8	6		10	1	12

Edge File

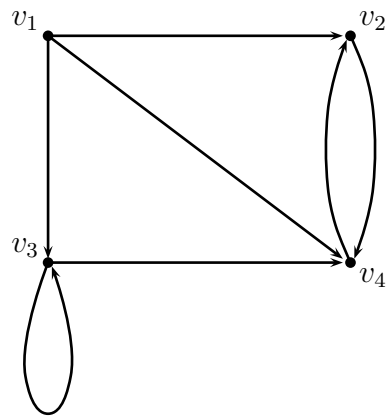
	1	2	3	4	5	6	7	8	9	10	11	12
BEG-V	8	5	3		5	5	3	4	1	7		9
END-V	9	4	7		3	1	1	3	8	8		1
NEXT-E	0	5	7		0	2	0	0	0	0		0
WEIGHT	4	3	2		8	4	1	2	2	5		1

(a) Find the adjacency lists of G.

(b) Draw the graph of G.

(c) Is G unilaterally connected? strongly connected?

2. Consider the following digraph G.



(a) Find the adjacency matrix A of the graph G.

(a) Find the path matrix P of the graph G.

3. Find a topological sort T of the following digraph G.

$$G = [A : C, S;\ \ B : T, Z;\ \ C : 0;\ \ D : Z;\ \ X : A;\ \ Y : A;\ \ Z : X, Y;\ \ S : 0;\ \ T : Y].$$

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4. Suppose Korea Airlines has ten daily flights as follows:

101 Seoul(S) to Busan(B)

103 Seoul to Gwangju(G)

202 Busan to Seoul

207 Woolsan(W) to Kangneung(K)

303 Mokpo(M) to Seoul

309 Gwangju to Woolsan

109 Gwangju to Jeju(J)

407 Kangneung to Busan

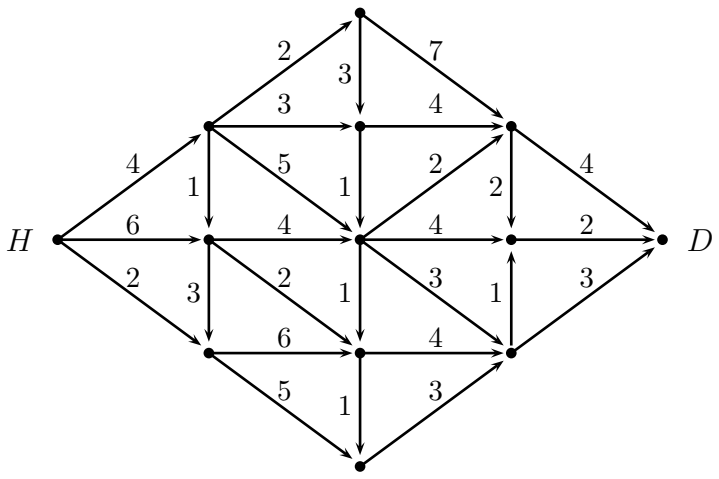
503 Jeju to Seoul

508 Kangneung to Mokpo

(a) Describe the data by means of a labelled directed graph T.

(b) List the seven vertices in the order B,G,J,K,M,S,W and then describe the graph T in memory using a linked representation.

5. Use the pruning algorithm to find the shortest path from home H to a destination D in the following digraph.



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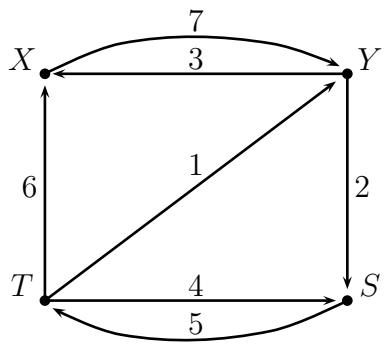
6. Consider the weighted graph G.



(a) Find the weight matrix W of G.

(b) Find the matrix Q of shortest paths using Warshall's algorithm.

7. Consider the algebraic expression

$$E = \frac{(3x - 5z)^4}{a(2b + c^2)}$$

(a) Draw the corresponding binary tree T, using a hat ($\wedge$) for exponentiation, an asterisk (*) for multiplication, and a slash (/) for division.

(b) Find the preorder of T.

(c) Find the sequential representation of T in memory.

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8. Suppose data items A, B, C, D, E, F, G are given with weights 10,30,5,15,20,15,10, respectively.

(a) Find a 2-tree with the given weights and a minimum path length P.

(b) Find a Huffman code for the data.

9. Let T be the binary tree stored in memory as follows, where ROOT=14.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
I	*H*	*R*		*P*	*B*		*E*		*C*	*F*	*Q*	*S*		*A*	*K*	*L*		*D*
L	4	0		0	18		1		0	15	0	0		5	2	0		0
R	11	0		0	7		0		10	16	12	0		9	0	0		0

I = INFO, L = LEFT, R = RIGHT

(a) Draw the diagram of T.

(b) List the nodes of T in (i) preorder, (ii) inorder, (iii) postorder.