淡江大學 99 學年度轉學生招生考試試題

系別：資訊工程學系三年級　　　　科目：資　訊　概　論

本試題雙面印刷

1.(15%)Multiple-choice questions:

(1)If the memory address space is 16 MB and the word size is 8 bits, then _____ bits are needed to access each word.(A) 8(B) 16 (C) 24(D) 32

(2) The three steps in the running of a program on a computer are performed in the specific order.

(A)fetch, execute, and decode(B) decode, execute, and fetch

(C) fetch, decode, and execute (D)decode, fetch, and execute

(3)For the binary operator, if the input is two 0s, the output is 0. (A) AND (B) OR (C) XOR (D) All of the above

(4)When converting a decimal integer to base b, we repeatedly by b. (A) divide(B) multiply

(C) neither a nor b(D) both a and b

(5)The ___ layer of the TCP/IP protocol suite provides services for end users.(A)data-link (B)application

(C)transport (D)physical

2. (10%)Identify the following equalities are correct or incorrect,

(A) $n! = O(n^n)$;　(B) $3^n = O(2^n)$;　(C) $6n^3/(\log n +1)= O(n^3)$;

(D) $n^{1.001}+n\log n=\Theta(n^{1.001})$;　(E) $n^3 2^n + 6n^2 3^n = O(n^2 2^n)$;

(F) $\sum_{i=0}^{n} i^2 = O(n^3)$; (G)$n^{k+\varepsilon}+n^k \log n=\Theta(n^{k+\varepsilon})$ for all k and ε ,k≥0, and ε >0;

(H) $10n^3 + 15n^4 +100n^2 2^n = O(n^2 2^n)$;　(I) $n^2 / \log_n = \Theta(n^2)$　(J) $n^3 + 2^{100}n^2 = \theta(n^3)$

3.(10%)Give an analysis of the running time (Big-Oh will do) of the following five program fragments:

(1) sum=0;
　for (i=0; i<n; i++)
　　for (j=0; j<n×n; j++) sum++;
	(2) sum=0;
	　for (i=0; i<n; i++)
	　　for (j=0; j<i; j++) sum++;

4.(10%)A is a two dimensional array, the location of A(3,2) is 1110 and A(2,3) is 1115. Assume that each element occupies one address, and the size declaration is A(m,n) then (1)what is the location of A(1,4)? (2)what is the location of the first element of array A?

5.(10%)A symmetric matrix M is stored with its upper diagonal part stored in a one dimensional array with **column-major** order, i.e. M(1, 1) stored in A[0], M(1, 2)=M(2, 1) stored in A[1], M(2, 2) is A[2], M(1, 3)=M(3, 1) is A[3], M(2, 3)=M(3, 2) is A[4]. Let M(i, j) be stored in A[k], write a single expression for k in terms of i and j, the MAX and MIN functions can be used in this expression.

MAX function:　MAX(i, j)=i if (i>j) otherwise is j ;

MIN function:　MIN(i, j)=j if (i>j) otherwise is i

6(8%)Given the following **MAX** heap represented with array structure, show the new **MAX** heap by the array form after removing the root.

0	1	2	3	4	5	6
10	7	6	3	2	5	1

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7.(15%)For the following directed graph of Figure 1, obtain: (1)its adjacency matrix; (2)its adjacency list representation; (3)its strongly connected components;

Figure 1

8. (10%) Build the Breadth-first Spanning tree and Depth-first Spanning tree of Figure 2 from Vertex B.(You should select the vertex by **the alphabet order** when there are multichoice.)
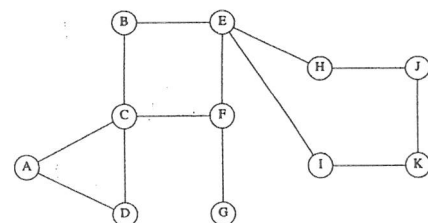
Figure 2

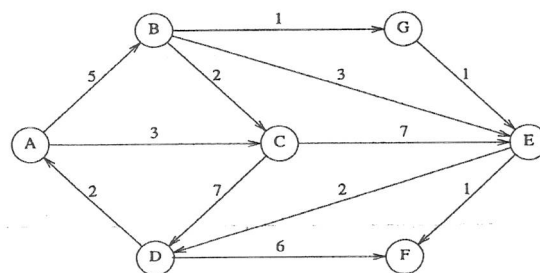9.(12%)Find the shortest path from A to all other vertices from the graph in Figure 3.

Figure 3