

大同大學 100 學年度(寒)轉學入學考試試題

考試科目: 資料結構

所別: 資訊工程學系

第 1/2 頁

註: 本次考試 不可以 參考自己的書籍及筆記; 不可以 使用字典; 不可以 使用計算器。

1. (10%) Suppose that A is a two-dimensional array and each element occupies 4 bytes. The address of A[5][3] is at 5314 and A[8][5] is at 5422. Find the address of the element A[2][7].

2. (8%) Determine the time complexities using Big-O notation (n is the number of data items processed):

- (a) $6n^3 / (\log_n + 1)$
- (b) $10n^3 + 15n^4 + 100n^2 2^n$
- (c) $10n^2 + 9$
- (d) $3n^n$

3. (10%) Write the output of the following recursive program if it is called with the instruction `xbox(3, 'A', 'B', 'C')`.

```
void xbox( int n, char x, char y, char z )
{
    if(n>0)
    {
        printf( "%c %c %c \n", x, y, z );
        xbox( n-1, x, z, y );
        xbox( n-1, y, x, z );
    }
}
```

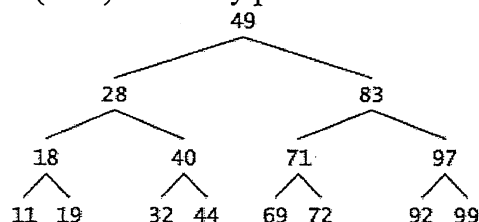
4. (10%) Draw a diagram to illustrate what the following C program does.

<pre>typedef struct node { void* dataPtr; struct node* link; } NODE;</pre>	<pre>int main (void) { // Local Definitions int* newData; int* nodeData; NODE* node; // Statements newData = (int*)malloc (sizeof (int)); *newData = 7; node = createNode (newData); newData = (int*)malloc (sizeof (int)); *newData = 75; node->link = createNode (newData); nodeData = (int*)node->dataPtr; printf ("Data from node 1: %d\n", *nodeData); nodeData = (int*)node->link->dataPtr; printf ("Data from node 2: %d\n", *nodeData); return 0; } // main</pre>
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5. (12%) Please complete following notation translation.

Infix	Prefix	Postfix
(1)	$+ \times - \times A B C \times D E / \times F G H$	(2)
(3)	(4)	$A B C \times D E + - / F G - \times$
A and B or C or not(E>F)	(5)	(6)

6. (10%) Manually provide the inorder, preorder and postorder traversals of the binary search tree.



<背面繼續>

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7. (10%) Consider the formula for evaluating the number of hash table comparisons:

$$c = \frac{1}{2}(1 + \frac{1}{1-L}),$$

where c = the number of comparisons and L = the load factor.

Given that a hash table of size 100,000 contains 20,000 items, how many comparisons are expected in a linear probe for an item?

8. (10%) Suppose G is an undirected graph consisting of the following sets:

1) $V = \{0, 1, 2, 3, 4, 5, 6\}$

2) $E = \{\{0,1\}, \{0,2\}, \{1,2\}, \{1,3\}, \{1,4\}, \{2,5\}, \{2,6\}\}$

Starting at vertex 0, a possible visit sequence representing a breadth-first search of G is _____.

9. (10%) Please write the **adjacency matrix**, **transitive closure matrix**, and **reflexive closure matrix** of the following directed graph.

