

國立中正大學

109 學年度碩士班招生考試

試題

[第 1 節]

科目名稱	計算機概論
系所組別	資訊管理學系－ 甲組 乙組

－作答注意事項－

※作答前請先核對「試題」、「試卷」與「准考證」之系所組別、科目名稱是否相符。

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科目名稱：計算機概論

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[Session I] Multiple Choice

Choose ONE answer only for each question (4 points for each question)

選擇題(單選，每題 4 分)

1. Which value is the result of the following subtraction problem using two's complement notation?

$00001111 - 10101010$

- A. 10110101 B. 10111001 C. 01010101 D. 011000101

2. Which of the following items of information linked together in Berners-Lee "web of notes" ?

- A. Trails B. Nodes C. Links D. Icons

3. Which layer of the TCP/IP hierarchical protocol actually transmits a message?

- A. Application B. Transport C. Link D. Network

4. What is the output of the following code fragment?

```
int[] numarray = { 10, 20, 30, 40, 50 };  
System.out.print(numarray[2]);  
System.out.print(numarray[3]);
```

- A. 1050 B. 2030 C. 3040 D. 4050

5. If a stack contain the entries *wa*, *xb*, *yc*, *zd* (from top to bottom), which of the following statement would be the contents after two entries were removed and the entry *re* was inserted?

- A. *wa*, *xb*, *re* B. *yc*, *zd*, *re* C. *re*, *yc*, *zd* D. *re*, *wa*, *xb*

6. The _____ relational operation combines data from more than one relation.

- A. SELECT B. JOIN C. PROJECT D. Schema

7. Which of the following data mining techniques would be applied when trying to identify any underlying heterogeneity within borrowers' patterns in a bank?

- A. Class description B. Class discrimination
C. Cluster analysis D. Association analysis

8. In the RGB color system, there are 256 possible values for each red, green, and blue color. Which of the following value is the possible color could be represented?

- A. 768 B. 16,777,216 C. 256 D. 1.39×10^{122}

9. What of the following value is the time complexity of the problem of searching for a particular entry in a

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系所組別：資訊管理學系-甲組、乙組

list?

- A. $\Theta(\log_2 n)$ B. $\Theta(n)$ C. $\Theta(n \log_2 n)$ D. $\Theta(n^2)$

10. Which of the following algorithms represents an optimal solution in terms of time complexity for sorting a list?

- A. Insertion sort B. Bubble sort C. Selection sort D. Merge sort

11. What is the output of the following code fragment?

```
int s = 1;
int n = 1;
do
{
    s = s + n;
    n++;
}
while (s < 10 * n);
System.out.println(s);
```

- A. 211 B. 210 C. 120 D. 123

12. S/MIME cryptographic algorithms use _____ to specify the requirement level.

- A. CAN and MUST B. SHOULD and CAN
C. SHOULD and MIGHT D. SHOULD and MUST

13. Which of the following term is used for certified 802.11b products ?

- A. WAP B. Wi-Fi
C. WEP D. WPA

14. Which of the following layer of the IEEE 802 reference model contain the functions of encoding and decoding of signals as well as bit transmission and reception?

- A. media access layer B. control layer
C. logical link layer D. physical layer

[Session II] Problems and Calculations

1. (a) (3 pts) Rewrite the binary representations of 10.011 into its equivalent base ten representation.

(b) (3 pts) Rewrite the ten representation of 0.01 into its equivalent binary notation.

2. Under what condition is each of the following data compression techniques most effective? Please give a

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specific example or explanation of each.

(a) (4 pts) Run-length encoding

(b) (4 pts) Relative encoding

3. (6 pts) Identify and explain the three main categories of software. Give a specific example of each.

4. Please write the HTML tag that performs following functions.

(a) (3 pts) Begins the part that describes what will appear on the computer screen

(b) (3 pts) Marks the end of the HTML document

(c) (3 pts) Marks the beginning of a paragraph

(d) (3 pts) Marks the end of a term that is linked to another document

5. (6 pts) Given the two relations X and Y below

X:	<u>A</u>	<u>B</u>	Y:	<u>C</u>	<u>D</u>
	2	s		t	1
	5	z		r	3
				w	2

Draw the relation Result that would be produced by the following statements.

Temp JOIN *X* and *Y* where $X.A > Y.D$

Result PROJECT *X.B*, *Y.C* from *Temp*

6. Suppose an operating system allocates time slices in 10 millisecond units. Assume the time required for a context switch is negligible.

(a) (3 pts) How many processes can obtain a time slice in one second?

(b) (3 pts) How many processes can obtain a time slice in one second if half of them use only half of their slice?

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[第 2 節]

科目名稱	管理資訊系統
系所組別	資訊管理學系-甲組

—作答注意事項—

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科目名稱：管理資訊系統

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系所組別：資訊管理學系-甲組

總共 4 題，每題 25 分

1. Regarding the principal risk factors in information systems projects, please
 - a. Identify and describe each of the principal risk factors in information systems projects. (8 分)
 - b. Identify and describe the strategies for controlling project risks. (8 分)
 - c. Explain how sociotechnical design practices can mitigate human and organizational issues that arise when building information systems. (9 分)
2. Regarding using intelligent techniques for knowledge management, please
 - a. Define an expert system, describe how it works, and explain its value to business. (8 分)
 - b. Define case-based reasoning and explain how it differs from an expert system. (8 分)
 - c. Define a neural network, describe how it works, and explain its value to business. (9 分)
3. Regarding information systems security and control, please
 - a. Explain how security and control provide value to business. (8 分)
 - b. Define computer forensics and explain what it is used for. (8 分)
 - c. Distinguish between disaster recovery planning and business continuity planning. (9 分)
4. Regarding business intelligence and business analytics, please
 - a. Define and describe business intelligence and business analytics. (8 分)
 - b. Describe predictive analytics and provide two examples. (8 分)
 - c. Describe big data analytics and provide two examples. (9 分)

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[第 2 節]

科目名稱	資料結構
系所組別	資訊管理學系-乙組

—作答注意事項—

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1. Figure 1 is a social network of persons. (a) Please draw the adjacent array for the network; (b) Suppose the hub of a social network is defined as the one with the most links upon him/her. In this graph, the hub is Bob. Please write a subroutine (in any programming code) to find the hub. (10 points for each sub-question)

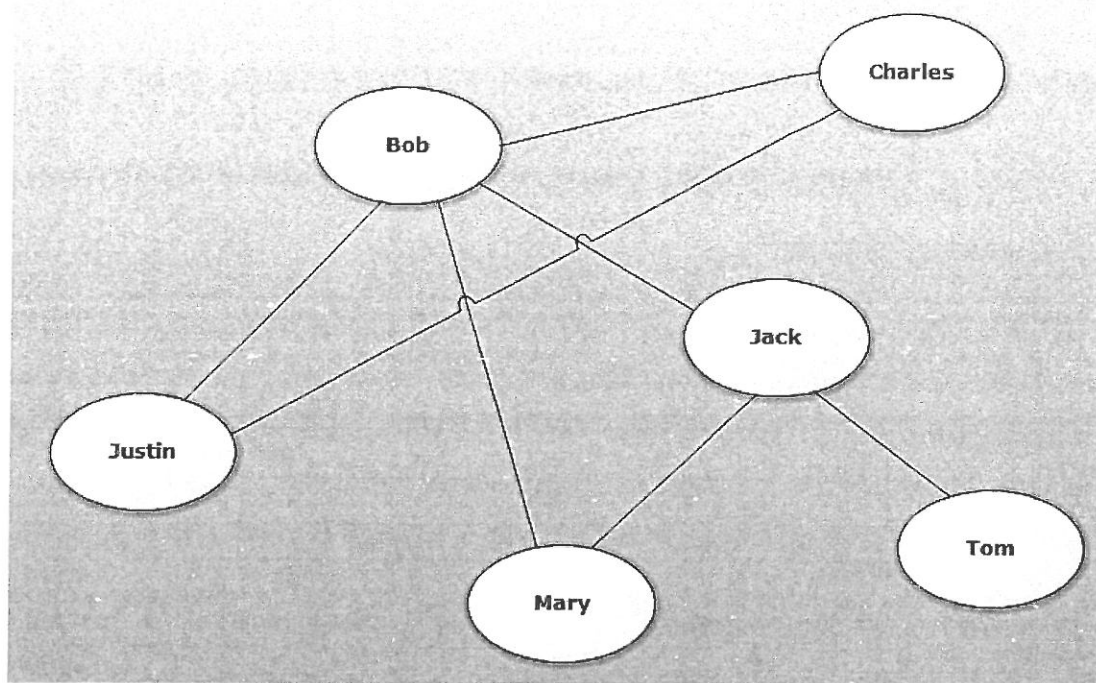


Figure 1.

2. Assume you use AVL tree to store the data and there come the six data 15, 4, 26, 1, 8 and 14 in the order and one by one. (a) Please draw the AVL tree from an empty AVL tree to insert the data into the tree (i.e., you need to draw six AVL trees to show the six insertions). (b) Suppose you delete the data 26, and 4 one by one from the tree. Please draw the AVL tree. Also, you need to draw two AVL tree to show the results of the two deletions. (10 points for each sub-question)
3. (a) Write a subroutine to count the number of nodes in a double circularly linked list. Suppose each node in the circular linked list has three fields, as follows:

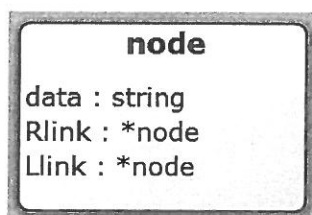


Figure 2.

In addition, there is a link variable, Top, pointing to a node in the circular linked list. (b) suppose you want to delete a node with data being 'CCU'. Please write the subroutine to do it. Note your program

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should consider the situation that the data with value being 'CCU' may or may not exist in the double circularly linked list. (10 points for each sub-question)

4. (a) Write a recursive function to add all the elements in a $n \times n$ (two dimensional) array of integers, $n \geq 1$.

For example, the result of $\begin{bmatrix} 3 & 8 \\ 9 & 13 \end{bmatrix}$ for the addition is 33. (b) Assume the addition of two matrixes is defined

as the addition of the two elements in the same position of the two arrays. For example, $\begin{bmatrix} 3 & 8 \\ 9 & 13 \end{bmatrix} +$

$\begin{bmatrix} 10 & 3 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} 13 & 11 \\ 7 & 14 \end{bmatrix}$. (Note: your answer must be written in a recursive function, otherwise, no points).

(10 points for each sub-question)

5. Figures 3(a) and 3(b) are the depth-first and breath-first search algorithms, respectively. The two algorithms are annotated with numbers before each of their statements. Please write the execution sequence in these numbers step by step to travel the graph from vertex 3 in Figure 3(c). If more than one link can be traverse, the algorithm always chooses the link the smallest one in alphabetical order.

You only need to write the step numbers, like 1, 2, 3, 4, 3, 4, ..., to answer the following two sub-questions. (a) Travel the graph in DFS manner; (b) Travel the graph in BFS manner. (10 points for each sub-question)

Algorithm DFS(G, v):

label v as visited

```

1 for all edge  $e$  in  $G.\text{incidentEdges}(v)$  do
2   if edge  $e$  is unvisited then
3      $w \leftarrow G.\text{opposite}(v, e)$ 
4     if vertex  $w$  is unexplored then
5       label  $e$  as a discovery edge
6       recursively call DFS( $G, w$ )
7   else
8     label  $e$  as a back edge
    
```

Figures 3(a)

Algorithm BFS(s):

```

1 initialize collection  $L_0$  to contain vertex  $s$ 
2  $i \leftarrow 0$ 
3 while  $L_i$  is not empty do
4   create collection  $L_{i+1}$  to initially be empty
5   for all vertex  $v$  in  $L_i$  do
6     for all edge  $e$  in  $G.\text{incidentEdges}(v)$  do
7       if edge  $e$  is unexplored then
8          $w \leftarrow G.\text{opposite}(v, e)$ 
9         if vertex  $w$  is unexplored then
10          label  $e$  as a discovery edge
11          insert  $w$  into  $L_{i+1}$ 
12        else
13          label  $e$  as a cross edge
14    $i \leftarrow i + 1$ 
    
```

Figure 3(b)

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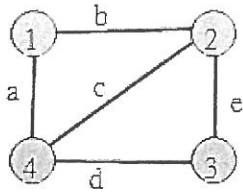


Figure 3(c)

