1. 廠商交貨 6 台冰箱，其中 2 台為瑕疵品，買主將陸續檢查此 6 台冰箱，請計算以下狀況發生機率：
   (a)在檢查第 4 台冰箱時，發現第 2 台瑕疵品的機率為何？(2%)
   (b)買主不需檢查 4 台以上的冰箱就發現這 2 台瑕疵品的機率為何？(5%)
   (c)在檢查前 2 台時剛好發現 1 台瑕疵品，則在檢查第 3 或第 4 台時發現第 2 台瑕疵品的機率為何？(5%)

2. A 公司過去上市新產品成功率為 40%，成功上市新產品可使該公司獲利 700 萬元，但失敗將損失 450 萬元；且根據過去經驗，A 公司若事先進行市場調查，有 90%成功產品的市調結果是好的，而 70%失敗產品則事先就有不好的市調結果。請回答下列問題：
   (a)計算好、壞二種市場調查結果預測新產品成敗的準確率。(4%)
   (b)依貝氏決策理論估計 A 公司市場調查所得的資訊價值，並畫出決策樹。(14%)
   (c)說明 A 公司市場調查的合理成本。(2%)

3. 請依 Cube-Square Rule 估計 8 吋與 12 吋晶圓廠的效益，並比較其生產力差異，並依此觀點說明 8 吋晶圓廠外移大陸是否具有經濟或生產力上的合理性？(8%)

4. 二家相同規模的鄰近醫院具有相似的血液需求量，二家醫院都怕缺血影響民眾就醫意願或引發糾紛，因此每個月總是庫存 50 公升血液，使發生缺血的機會僅 5%；但血液僅有一個月有效期，過期未用即需棄置，發生高額成本，而且因兩家相近，若一家發生缺血，即代表另一家血液庫存耗損量增加。請討論：
   (a)二家醫院進行聯合庫存的可行性如何？(2%)
   (b)若二家醫院依現有血液存量水準進行聯合庫存，缺血率為何？(3%)
   (c)二家醫院實施聯合庫存後，想要維持 5%的缺血率，二家必須維持之血液總庫存為多少？(5%)

國 立 雲 林 科 技 大 學
九十一學年度研究所碩士班入學考試試題

系所：企管系、資管所
科目：統計學

5. Under what kind of conditions (please give an example for each sampling method) would you recommend: (a) A simple random sample (b) A cluster sample (c) A stratified sample (d) A systematic sample [20%]

6. Consider independent random samples $X_1, X_2, \ldots, X_n$ from normal distribution $N(\mu_1, \sigma_1^2)$; and $Y_1, Y_2, \ldots, Y_m$ from normal distribution $N(\mu_2, \sigma_2^2)$; where all μ_1, μ_2, σ_1^2 and σ_2^2 are unknown, please identify (a) variance (b) degree of freedom (c) test statistic, of any situations when compare two samples means [30%]

國 立 雲 林 科 技 大 學
九十一學年度研究所碩士班入學考試試題

系所：資管系
科目：資訊管理導論

1. Please briefly discuss (A) DeLone and McLean's Model of IS Success[15%]

    (B) McFarlan and McKenney's Information Technology Strategic Grid[10%]

2. Please identify and discuss reasons why IS projects are more vulnerable to failure than other types of projects. ?   [25%]

3. Please draw 2 figures for traditional value chain and customer-oriented value chains [25%]

4. Explain the benefits of fuzzy logic and neural network integration. [25%]

國立雲林科技大學
九十二學年度研究所碩士班入學考試試題

系所：資管系　科目：計算機概論 (甲)

選擇題：單選題，共 50 題，每題 2 分，答錯不倒扣。

1. A method of obtaining information, know as _____, relies on a client computer to request a Web page from a server.
   (A) Pull technology
   (B) Push technology
   (C) Online technology
   (D) webcasting

2. Software donated for public use that has no software restrictions is
   (A) shareware
   (B) public domain software
   (C) freeware
   (D) copyrighted

3. Current technology supports live radio broadcasting, live video concerts due to _____ technology.
   (A) linking
   (B) subscribing
   (C) posting
   (D) streaming

4. A Web page that offers a variety of Internet services from a single, convenient location is called a(n) _____ .
   (A) Web community
   (B) informational Web page
   (C) news Web page
   (D) portal

5. The most popular use for C2C e-commerce is _____
   (A) peer-to peer transactions
   (B) online auctions
   (C) individual to business transactions
   (D) brokering

6. The rules governing how information travels along a network are included under

    _____

    (A) types of wireless transmission
    (B) transmission protocols
    (C) types of networks
    (D) devices connected to a network

7. _____ will search for sites that have changed or have been recently added to the World Wide Web.

    (A) Web browser
    (B) Search engine
    (C) Spider
    (D) Gopher

8. Another name for object-oriented graphics is_____.

    (A) bitmapped graphics
    (B) three-dimensional graphics
    (C) raster graphics
    (D) vector graphics

9. Which of the following types of computer crime involves invading a communication system by riding behind a legitimate user with a password?

    (A) data diddling
    (B) piggybacking
    (C) the Trojan horse
    (D) salami slicing

10. Some _____ can learn a user's interests, develop a user profile, search the entire internet to find relevant documents, and automatically deliver the information to the desktop.

    (A) neural networks
    (B) network agents
    (C) shopping carts
    (D) electronic storefronts

11. A _____ is a network that connects computers and devices in a limited geographic area, such as a home, school computer laboratory, office building, or closely positioned group of buildings.
   (A) local area network (LAN)
   (B) wide area network (WAN)
   (C) metropolitan area network (MAN)
   (D) central area network (CAN)

12. When compared to cables that use wire, such as twisted-pair and coaxial cables, all of the following are advantages of fiber-optic cables except _____
   (A) less susceptibility to noise (interference) from other devices
   (B) faster data transmission
   (C) less cost and easier installation and modification
   (D) better security for signals during transmission

13. Which of the following is a LAN technology that allows personal computers to contend for access to the network?
   (A) TCP/IP
   (B) Ethernet
   (C) WAP
   (D) Token ring

14. Which of the following is a set of standards for digital transmission of data over standard copper telephone lines?
   (A) cable television line
   (B) Integrated Services Digital Network
   (C) T-carrier line
   (D) Asynchronous transfer mode

15. To track a customer's path through a site, e-commerce software programs use _____.
   (A) banner ads
   (B) spam
   (C) worms
   (D) cookies

16. Surveys indicate that a large percentage of customers are dissatisfied with _____ at online businesses.
    (A) product availability
    (B) customer service
    (C) additional taxes
    (D) all of the above

17. The most popular private key encryption system is _____.
    (A) the data encryption standard (DES)
    (B) the Clipper chip.
    (C) RSA encryption
    (D) Fortezza

18. Software piracy is a serious offense because it _____.
    (A) increases the chance of viruses
    (B) reduces the ability to receive technical support
    (C) drives up the price of software for all users
    (D) all of the above

19. Secure HTTP (S-HTTP) _____.
    (A) is a notice, issued and verified by a certificate authority, that guarantees a user or Web site is legitimate
    (B) provides private-key encryption of all data that passes between a client and a server
    (C) allows users to choose an encryption scheme for the data that passes between a client and a server
    (D) uses a public-key encryption to secure credit-card transaction systems

20. A polymorphic virus _____.
    (A) modifies its program code each time it attaches itself to another program or file
    (B) is a malicious-logic program that copies itself repeatedly in memory or on a disk drive until no memory or disk space remains
    (C) is a malicious-logic program that hides within or looks like a legitimate program
    (D) infects a program file, but still reports the size and creation date of the original, uninfected program

21. Which of the following is an unsolicited e-mail message or newsgroup posting sent to many recipients or newsgroups at once?
    (A) A flame
    (B) An emticon
    (C) A spoiler
    (D) Spam

22. Which of the following is a process of collecting data from the Internet as a source for a data warehouse?
    (A) Data farming
    (B) Web farming
    (C) Data mining
    (D) Web mining.

23. Symptoms of carpal tunnel syndrome (CTS) include all of the following except
    _____.
    (A) extreme pain that extends from the forearm to the hand
    (B) numbness in the thumb and first two fingers
    (C) burning pain when the nerve is compressed
    (D) tingling in the thumb and first two fingers

24. The program develop life cycle begins at the start of the _____ phase in the system development life cycle.
    (A) planning
    (B) analysis
    (C) implementation
    (D) support.

25. _____, developed as a procedural language similar to C, in its latest release is an interpreted scripting language with powerful text processing capabilities.
    (A) Java
    (B) JavaScript
    (C) Perl
    (D) PerlScript

26. What is the result of the following Java program?

```java
public class Conversion {
    public static void main(String[ ] args) {
        double   x;
        x = Math.round(2.0D * Math.abs(-14343 / 2344) * 100) / 100.0;
        System.out.println("x = " + x);
    }
}
```

(A) x = 12.0　　(B) x = 12.24　　(C) x = -12.0　　(D) x = -12.24

27. A Java class Simple1 is declared as

```java
public class Simple1 {
    static private int i;
    private int j;
    public Simple1(int x) {
        j = x;
    }
    static public void method1(int x) {
        i = x;
    }
    public void method2(int x) {
        j = x;
    }
}
```

Consider another Java class MainSimple1. In its main method, a local variable simple1 is declared and initialized as

```java
Simple1 simple1 = new Simple1(20);
```

Which one of the following statements in main is incorrect?

(A) simple1.method1(30);　　　　(B) simple1.method2(40);

(C) Simple1.method1(50);　　　　(D) Simple1.method2(60);

28. Which one of the following steps is incorrect, if we want to set a Java object to be an action listener?

(A) Import the Java event-handling classes.

(B) Modify the class declaration to include the clause extends ActionListener.

(C) Add the actionPerformed method to the class declaration.

(D) Register the object to the event source as its action event listener.

29. For each of the following Java expressions, assume x is 10, y is 20, and z is 30, Which one of the following Boolean expressions is true?

(A) x > y && y > x

(B) x - z == x && Math.abs(y - z) == x

(C) !(x < y + z) || !(x + 10 <= 20)

(D) !(x == y) && (x != y) && (x < y || y < x)

30. What will be the value of sum after the following Java nested loop is executed?

```
int sum = 0;
for (int i = 0; i <= 10; i++)
    for (int j = 10; j > 2 * i; j--)
        sum = sum + (j - i);
System.out.println(sum);
```

(A) 120 　(B) 145 　(C) 165 　(D) 180

31. Which one of the following SQL statements is syntactically and semantically correct?

(A) select　　name, salary
　　from　　emp
　　where　　salary > all　(select　salary
　　　　　　　　　　　　　　　　from　　emp);

(B) select　　name, birthdate
　　from　　emp
　　where　　birthdate =　(select　min(birthdate)
　　　　　　　　　　　　　　　　from　　emp);

(C) select　　name, deptno
　　from　　emp
　　group by　deptno;

(D) select　　name, address
　　from　　emp
　　where　　id > '100'
　　ordered by　name;

32. Consider the case in which a relation R has 120 tuples and another relation S has 160 tuples. Let C be a join condition between R and S, and the join result based on C has 20 tuples. What is the join selectivity of C?

(A) 0.001　　　(B) 0.071　　　(C) 0.167　　　(D) 0.125

33. Suppose a table T is defined as follows:

    create table T

    (...,

    starttime time with time zone,

    ...);

    A user execute the following insert operation:

    insert into T (..., starttime, ...)

    values (..., time '10:00:00-08:00', ...);

    What is the interpretation of the above starttime as a UTC (Universal Coordinated Time) value?

    (A) 2:00:00　　(B) 8:00:00　　　(C) 10:00:00　　(D) 18:00:00

34. Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$. What is the key for R?

    (A) $\{B, F\}$　　　(B) $\{B, D\}$　　(C) $\{A, D\}$　　(D) $\{A, B\}$

35. Consider a disk with the following characteristics: block size $B = 512$ bytes, interblock gap size $G = 128$ bytes, number of blocks per track = 20, number of tracks per surface = 400. A disk pack consists of 15 double-sided disks. What is the total capacity of a disk pack?

    (A) 61.44Mbytes　　(B) 76.8Mbytes　　(C) 122.88Mbytes　(D) 153.6Mbytes

36. Consider the situations in which two or more processes are reading or writing some shared data and the final result depends on who runs first, the situations are called

    (A) dynamic binding　　　　　(B) demand paging

    (C) race conditions　　　　　(D) busy waiting

37. Consider a disk with 40 cylinders. A request comes in to read a block on cylinder 11. While the seek to cylinder 11 is in progress, new requests come in for cylinders 1, 36, 16, 34, 9, and 12, in that order. What is the disk arm scheduling algorithm used if the sequence of seeks is 11, 12, 9, 16, 1, 34, and 36?

    (A) first-come, first-served　　(B) shortest seek first

    (C) elevator algorithm　　　　(D) bank's algorithm

38. We are sending a 30 Mbit MP3 file from a source host to a destination host. Suppose there is only one link between source and destination with a transmission rate of 10 Mbps. Also suppose that message switching is used, with the message consisting of the entire MP3 file. How many bits will the source have transmitted when the first bit arrives at the destination?
    (A) 10,000   (B) 500,000   (C) 15,000,000   (D) 30,000,000

39. Internet telephony typically runs over
    (A) HTTP   (B) TCP   (C) UDP   (D) SMTP

40. When a TCP segment arrives to a host, the socket to which the segment is directed depends on
    (A) the source IP address of the datagram that encapsulated the segment
    (B) the destination port number
    (C) the source port number
    (D) all of the above

41. When a UPD segment arrives to a host, in order to direct the segment to the appropriate socket, the OS uses
    (A) the destination port number   (B) the source IP address
    (C) the source port number   (D) all of the above

42. ICMP protocol
    (A) runs on top of TCP   (B) runs directly on top of IP
    (C) runs on top of UDP   (D) none of the above

43. An undirected graph G is a pair (V, E), where V is the vertex set and E is the edge set. Let the degree of a vertex in an undirected graph be the number of edges incident on it, then $\sum_{v \in V} degree(v) =$

    (A) $2|E-1|$ (B) $2|E|$ (C) $2|E+1|$ (D) $2|E+2|$

44. Given an open-address hash table T with m slots that store n elements. T's load factor $\alpha = n/m$ is less than 1. Assuming uniform hashing, the expected number of probes in an unsuccessful search is at most
    (A) $1/(2+\alpha)$ (B) $1/(2-\alpha)$ (C) $1/(1+\alpha)$ (D) $1/(1-\alpha)$

45. Which one of the following is NOT a category for debugging approaches?
    (A) versioning　　　　　(B) brute force
    (C) backtracking　　　　(D) cause elimination

46. Which one of the following is NOT a part of the CK metrics suite?
    (A) weighted methods per class　　(B) depth of the inheritance tree
    (C) class size　　　　　　　　　(D) number of children

47. Which one of the following is correct?
    (A)　A formal and detailed description of information domain, function, performance, interfaces, design constraints, and validation criteria is essential for software efforts.
    (B)　Whenever a software project gets behind schedule, the best way to catch up is to add more programmers.
    (C)　Project requirements continually change, but change can be easily accommodated because software is flexible.
    (D)　The only deliverable for a successful project is the working program.

48. Steganography serves to
    (A) recover the plaintext of a message without access to the key
    (B)　ensure that a sender should not be able to falsely deny later that he sent a message
    (C) hide secret messages in other messages
    (D) enable the receiver of a message to ascertain its origin

49. Which one of the following is vulnerable to chosen-plaintext attack?
    (A) one-time-pads cryptosystem
    (B) symmetric cryptosystem
    (C) public-key cryptosystem
    (D) hybrid cryptosystem

50. Consider a function f with the following properties: it is easy to compute $f(x)$ given x; and hard to compute x given $f(x)$; however, there is some secrete information y, such that given $f(x)$ and y it is easy to compute x. Function f is called a
    (A) trapdoor one-way function　　　(B) interlock function
    (C) self-shrinking generator function　(D) elliptic curve function

一、單選題 (每題 2 分 共 40 分)

1. 物件導向程式語言中，儲存物件屬性值的記憶體是配置給以下哪一種變數？
   （A）local variable
   （B）global variable
   （C）class variable
   （D）instance variable

2. 以下有關功能式程式設計 (functional programming) 的敘述何者正確？
   （A）程式中變數的值不能改變
   （B）C 語言不能以功能式程式設計的方式撰寫程式
   （C）while loop 常常使用在以功能式程式設計方式撰寫的程式中
   （D）功能式程式語言的變數必須先宣告其型態後才能使用

3. 以下哪一個指令是 Unix 系統下，列出目錄內之檔案的詳細內容的指令？
   （A）ld -al
   （B）ld -all
   （C）ls -al
   （D）ls -L

4. 以下哪一個指令是 Unix 系統下，更改檔案存取權限的指令？
   (A) chmod
   (B) chacs
   (C) chright
   (D) chown

5. 以下有關 Apache 軟體的描述何者正確？
   （A）Apache 是要付費才能使用的軟體
   （B）Apache 是一個網路管理軟體
   （C）Apache 是 HTTP 的伺服器
   （D）Apache 在微軟的視窗作業系統上不可以使用

6. 以下哪一個程式語言不常用來撰寫網路應用程式？
   （A）Apl
   （B）Python
   （C）Perl
   （D）JSP

7. 以下有關 CGI 的描述何者正確？
   （A）CGI 是一個網路應用程式的名稱
   （B）CGI 是一個網路應用程式與 HTTP 伺服器溝通的標準介面
   （C）Java 語言不能用來撰寫 CGI 的程式
   （D）ASP 常被用來撰寫 CGI 的程式

8. 以下有關 Java 程式語言的敘述何者不正確？
   （A）一個 Java 程式使用到的 class 需要在該程式執行前都載入 Java 的 virtual machine 中
   （B）Java 程式在執行時由於有 automatic garbage collection 的功能所以不會有 memory leak 的現象
   （C）Just-in-time compilation 是提升 Java 程式執行效率的技術
   （D）Java 不支援 multiple inheritance

9. 以下有關多執行緒 (multiple threads) 的敘述何者不正確？
   （A）Java 支援多執行緒的功能
   （B）不同的 thread 有個別的地址空間 (address space)
   （C）Multiple threads 也是分時 (time sharing) 執行的一種方式
   （D）不同的 thread 可以分享同一 process 內的地址空間

10. 以下有關程式語言中型態 (type) 的描述何者不正確？
    （A）C 語言不能在 compile-time 找出所有變數型態誤用的錯誤
    （B）Dynamic type 的語言在程式執行時才檢查型態誤用的錯誤
    （C）Perl 是一個 dynamic type 的語言
    （D）陣列存取超越界線(array reference out of bound)是一種在執行時發生的型態錯誤 (type error)

11. 下列哪一種方式是區域網路與廣域網路皆可以使用的？
    (A) ATM   (B) ASL   (C) ISDN   (D) Frame Relay

12. 下列哪一種 Sort 在資料量大時比較花時間？
    (A) Quick Sort   (B) Merge Sort   (C) Insert Sort   (D) Heap Sort

13. 下列有關 .NET Framework 之敘述何者不正確？
    (A) 它是利用 MSIL(Microsoft Intermediate Language)所發展出的程式開發平台
    (B) 它支援微軟所開發的 Visual C++程式語言
    (C) Visual Studio .NET 是支援 .NET Framework 的開發環境
    (D) ASP(Active Server Pages)程式無法在 .NET Framework 上執行

14. C語言函數fun之定義如下：

```
char *fun(char *s1, const char *s2)
{
    register char *p = s1 + 2;
    while (*p)
        ++p;
    while (*p++ = *s2++)
        ;
    return s1;
}
```

試問 fun("abcd" , "efgh") = ?

  (A) efgh   (B) cdefgh   (C) efghabcd   (D) abcdefgh

15. 下列有關日本 NTT DoCoMo 無線上網服務(i-mode)之敘述何者不正確？

  (A) 此種服務具有價格便宜輕鬆使用的優點

  (B) 此種服務可以做到個人認證服務

  (C) 此種服務的網頁是利用 WML 語言來編寫的

  (D) 此種服務是利用封包來傳送訊息的

16. 下列有關 ER Model Concepts 之敘述何者不正確？

  (A) The ER model describes data as entities, relationships, constraints, and attributes.

  (B) The basic object that the ER model represents is an entity, which is a "thing" in the real world with an independent existence.

  (C) A relationship type R among n entity types E_1, E_2, $\cdots$, E_n defines a set of associations among entities form these types.

  (D) Relationship types usually have certain constraints that limit the possible combinations of entities that may participate in relationship instances.

17. 下列有關 Operating Systems 之敘述何者不正確？

  (A) Traditional a process contained a single thread of control as it ran, most modern operating systems now support processes that have multiple threads.

  (B) Most modern computer systems use disks as the primary on-line storage medium for both programs and data.

  (C) The First-come, first-served algorithm is preemptive; the Round-robin algorithm is nonpreemptive.

  (D) Operating systems are now almost always written in a systems-implementation language or in a higher-level language.

18. 下列有關 Expert Systems 之敘述何者<u>不正確</u>？

(A) The area of expert systems is a very successful approximate solution to the classic AI problem of programming intelligence.

(B) An explanation facility is an integral part of sophisticated expert systems..

(C) One of the most popular types of expert systems today is the rule-based systems.

(D) PROLOG is a good example of a forward chaining system that tries to solve a problem by breaking it up into smaller subproblems and solve them individually.

19. 下列有關 C++之敘述何者<u>不正確</u>？

(A) A reference is an alternative name, or alias, for an object which is currently in scope.

(B) A friend function is a non-member of a class which is given access to the public members of the class.

(C) Polymorphism is defined as having several forms, and in C++ means that some object refers to instances of various classes at run-time.

(D) Exceptions provide a means whereby a function, upon identifying an error situation for which it is unable to determine what is the correct course of action, can report this position to the calling function.

20. 下列有關 Electronic Commerce(EC)之敘述何者<u>不正確</u>？

(A) EC describes the manner in which transactions take place over network, mostly the Internet.

(B) Business-to-business electronic commerce implies that both the sellers and buyers are business corporations, while business-to-consumer electronic commerce implies that the buyers are individual consumers.

(C) Three typical architectural models of electronic marketplaces are supplier-oriented marketplace, buyer-oriented marketplace, and intermediary-oriented marketplace.

(D) There are two types of electronic stores: electronic distributors and electronic brokers. If the e-mail takes responsibility for order fulfillment, it is an electronic distributor. In contrast, electronic brokers only help the search process.
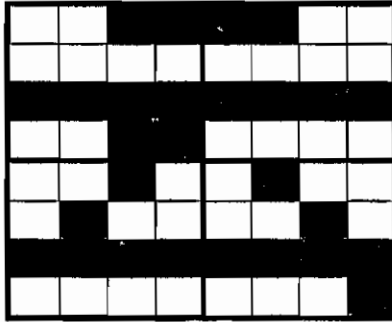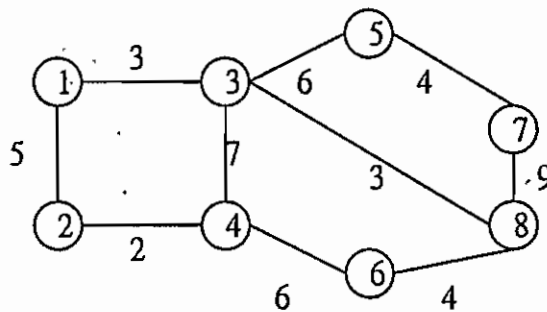
二、問答題 (60 分)

1. 當你想要在 Windows 作業系統下開發 Web-Based 應用系統時，你會採用何種方式來開發呢？又在 Linux 作業系統下，你會採用何種方式來開發呢？並說明其原因。(10 分)

2. 何謂 UML(Unified Modeling Language)？試問在系統分析與設計上如何使用 UML 呢？(10 分)

3. 何謂對稱金鑰密碼系統(Symmetric Cryptographic Algorithm)及非對稱金鑰密碼系統(Asymmetric Cryptographic Algorithm)？又非對稱金鑰密碼系統如何達到資料加密及數位簽章的功能呢？(10 分)

4. 請以 C 語言寫一程式，這個程式會從 stdin 輸入三個整數，然後會呼叫一個稱為是 order 的函數（function），呼叫 order 之後會將兩個整數從小到大排序。請利用 order 將三個整數從小到大排序後，輸出至 stdout。order 只有兩個型態是 * int 的地址參數，在執行後若第一個地址參數中存的值大於第二個地址參數中存的值，則會將兩個地址參數中的值互換。(15 分)

5. 請以 C、Perl、Java 或 Scheme 中的任一語言寫一個程式，這個程式中會定義一個內建之含有以下幾個整數的資料結構：

3, 4, 9, -5, -2, 7, 11, 25, -9, 14

- 請寫一函數（function）或方法（method），將這個資料結構傳入，並傳回這些數字的和。
- 請寫一函數（fiinction）或方法（method），將這個資料結構傳入，並傳回這些數字中是負數的個數。
- 請寫一函數（function）或方法（method），將這個資料結構傳入，並傳回這些數字的平均。
- 請寫一主程式，將上面三個函數（function）或方法（method）的傳回結果輸出至電腦螢幕（stdout）上。(15 分)

一、 試以四分樹(Quadtree)資料結構方式，來表示下列這張 8×8 的影像(白色為 0，黑色為 1)，並將該四分樹畫出 (*15 分*)。

二、 根據最新新聞報導，七十歲的漸凍人陳宏靠著「眨眼皮」和「動嘴角」的兩種方式，「寫」出了八本新書。假設你有一台電腦，可以毫無誤差的偵測到他的「眨眼皮」和「動嘴角」這兩個動作，請問你將設計什麼型態的資料結構和演算法，讓他可以用注音輸入法，以達到更快、更有效率、及更輕鬆地的運用電腦寫書(*25 分*)？

三、 某個二元樹其前序為 ABCDEFGH，中序為 CBAEFDHG，請畫出這棵二元樹 (*10 分*)。

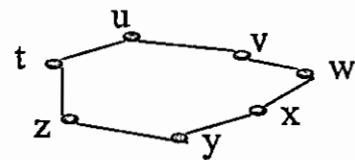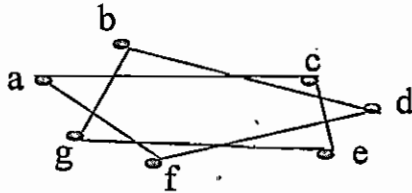四、 試分別寫出「深度優先搜尋」及「廣度優先搜尋」的演算法。並以下圖為例(以頂點①當作起始點)，畫出「深度優先搜尋」及「廣度優先搜尋」的圖形 (*15 分*)。

五、 試寫出一個遞迴程式，以找出二元樹中最長路徑之長度(*20分*)。

六、 何謂 Radix Sorting? 試舉例說明之。一般而言，Radix Sorting有兩種實作方式，一為利用 MSD (Most Signficant Digit) 作排序，二為利用 LSD (Least Signficant Digit) 作排序，試簡述這兩種方式之不同及其優缺點(*15分*)。

以下每題 10%共 100%:

1) 試證明：在邊長爲 1 的正三角形內, 任選 5 點, 則至少有 2 點其距離少於 1/2 .

2) a) 在 $Z_3[x]$ 中, 多項式 $p(x) = x^2 + x + 2$ 是否可因式分解?
   b) 試寫出 $Z_3[x]/(p(x))$.

3) a) 試定義 $K_{3,3}$.
   b) 試說明 $K_{3,3}$ 不爲平面圖 (Non-planar) .

4) 試解 $b_n = (n-1)(b_{n-1} + b_{n-2})$, 其中 $b_1 = 0$ 且 $b_2 = 1$.

5) a) 何謂 "NAND" 閘 ?
   b) 試證明：{ NAND } 爲 functionally complete .

6) a) Explain the terminology isomorphic.
   b) For the following pair of graphs, determine whether they are isomorphic. If they are, give functions $g: V(G) \rightarrow V(G')$ and $h: E(G) \rightarrow E(G')$ that define the isomorphism. If they are not, give an isomorphism invariant that they do not share.

7) Prove that every connected graph has a spanning tree.

8) Use symbols to write the logical form of each argument shown below, and then use truth table to test the argument for validity.

   If Tom is on team A, then Hua is on team B.

   If Hua is not on team B, then Tom is on team A.

   ∴ Tom is not on team A or Hua is not on team B.

9) Find a counterexample to show that the following statement is false :

   For all sets A and B, $(A \cap B) \cup C = A \cap (B \cup C)$.

10) A function f is defined on a set of real number. Determine whether or not f is one-to-one and justify your answer.

   $f(x) = (x+1)/x$, for all real number $x \neq 0$.

1. Identify a company that has become a market leader because of its innovative use of information systems. What other critical success factors for the company? (25%)

2. What are some reasons why companies value their transaction systems? (25%)

3. 何謂 M-Commerce？M-Commerce 將如何影響資訊相關產業的未來發展？為什麼？除資訊相關產業外，何種產業的未來發展也將深受 M-Commerce 之影響？什麼影響？為什麼？(25%)

4. 當未來硬體功能突飛猛進時，例如 CPU 速度達到目前的百倍，硬碟容量超過目前最大容量十倍時，對企業資訊系統發展趨勢將有何影響？對企業資訊人員又將有何影響？(25%)