國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：工管所
科目：作業研究

1. The arrival process to a drive-through fast-food window during rush hours is a Poisson process with rate 10/min. The service time per car is exponentially distributed with mean 5 sec.

   (a) Find the probability that there are k cars in the system. (5%)

   (b) Find the average number of cars in system.(5%)

   (c) Find the average delay time in queue.(5%)

   (d) If there are only 6 spaces available for waiting (including the one in service). Arriving car which finds the system full does not get in. Find the average time in system. (10%)

2. A production manager is planning the scheduling of two products on 3 machines. Each product can be produced on each of the machines. The unit production cost are:

	machine 1	machine 2	machine 3
product 1	4	6	5
product 2	6	7	5

The time (in hour) required to produce each unit product on each the machine is

	machine 1	machine 2	machine 3
product 1	5	10	4
product 2	4	5	5

Suppose 3000 and 4000 units of proucts are required and the available machine-hours are 2000, 2000 and 1000 hours respectively.

   (a) Formulate this problem as a linear program (5%)

   (b) What is the optimal production schedule (5%)

   (c) What is the shadow price of one unit capacity of machine 2, explain the meaning of this shadow price. (15%)

國立雲林科技大學 所別：工管所
八十七學年度研究所碩士班入學考試試題 科目：作業研究

3. You are given the opportunity to guess whether a coin is fair or two-headed, where the prior probabilities are 0.5 for each of these possibilities. If you are correct, you win $5; otherwise, you lose $5. You are also given the option of seeing a demonstration flip of the coin before making your guess. You wish to use Bayes' decision rule to maximize expected profit.

(1) (5%) Identify the actions, states of nature, and payoff table.
(2) (2%) What is the optimal action, given that you decline the option of seeing a demonstration flip?
(3) (3%) What is the expected value of perfect information regarding the state of nature?
(4) (10%) Draw the decision tree to show the decision procedure.
(5) (5%) What is the expected value of the demonstration flip?

4. (1) (5%) Provide your reasoning to support that all basic variables in every basic feasible solution of a transportation problem also have integer values (where every supply and demand has an integer value).

(2) (20%) A food company has four plants producing a certain product that is to be shipped to four distribution centers. Plants 1, 2, 3 and 4 produce 10, 20, 20 and 10 shipments per month, respectively. Distribution centers 1, 2, 3 and 4 needs to receive 20, 10, 10 and 20 shipments per month. The cost for each shipment from each plant to the respective distributing centers is given as follows:

	Distribution Center			
	1	2	3	4
Plant 1	5	6	4	2
Plant 2	2	M	1	3
Plant 3	3	4	2	1
Plant 4	2	1	3	2

(2a) Find an initial basic feasible solution by using the northwest corner ruler.
(2b) Iteractively apply the transportation simplex method to obtain an optimal solution.

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：工管所
科目：生產管理

1. Describe the differences between dependent demand and independent demand. (10%)

2. What are major differences of manufacturing and service operations in the area of capacity planning, inventory control and productivity measurement. (10%)

3. The average scores of P/OM class at NYIT in last 7 years are shown in the following table.

(a). Develop a 3-year moving average and exponential smoothing with a constant of 0.2 to forecast the average score of the 4th to the 8th year. (Assume the forecast of the 3rd year is 44)(10%)

(b). Which forecast method would you use? (Explain the reason for your answer.)(10%)

Year	Score
1	45
2	56
3	42
4	62
5	57
6	57
7	55

4. Consider the following demand and lead time data for a company's major product:

Demand per day	Probability	Manufacturing Lead Time (in Days)	Probability
1	0.4	2	0.3
2	0.6	3	0.7

If the reorder point is 2 units of the product, what will be the expected profit during lead time? Assume the price of each product is $15, the purchase cost of each product is $9 and the shortage cost of each product is $2. (20%)

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：工管所
科目：生產管理

5. Given the following data, construct a material requirements plan of A and B which will result in completing 100 units of Parent #1 (P1) at the beginning of week 7, and 200 units of Parent #2 (P2) at the beginning of week 8. (20%)

Item	Parent	Quantity required	On hand inventory	Schedule receipt	Lead time	Lot sizing policy
P1	-	-	-	-	1	lot-for-lot
P2	-	-	-	-	1	lot-for-lot
A	P1, P2	1; 2	80	0	1	Fixed quantity(500)
B	P1, P2	2, 1	40	0	3	Fixed quantity(250)
C	A, B	3,4	100	2000 (week 2)	2	Fixed quantity(2000)

6. A company has six jobs waited to be processed. The processing time and due date of each job are given in the following table.

(a) Try to find a schedule that can minimize the maximum lateness. (10%)

(b) What is the average number of job at workcenter in above schedule? (10%)

Job	Processing time (days)	Due date (days)
1	5	14
2	8	7
3	4	6
4	23	15
5	14	9
6	17	12

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：資管所、工管所
科目：計算機概論

Part I: (15%) Given the following 15 terms, choose one of the best description (from A to T) for each term. (答錯不倒扣)

1. Archie	2. Telnet	3. ISP	4. DNS	5. RPC
6. VOD	7. DHCP	8. HTTP	9.URL	10. HTTPS
11. IPX	12. NFS	13. PCMCIA	14. SMTP	15. SSL

A. A highly reliable packet network technology. Extensive error checking at each hop contributes to great reliability but introduces high latency and limits bandwidth.
B. A concept whereby cable television companies would transmit programs when subscribers asked for them.
C. The address to a specific resource's location.
D. A specification that supports IP traffic over serial connections.
E. A security service inserted between an application and the network stack.
F. The accepted standard for transmitting Electronic Mail over the Internet.
G. An interface specification for input/output devices.
H. A subroutine call made on one computer but satisfied on another.
I. A specification for credit-card-sized expansion cards used mostly in laptop computers.
J. A transparent network file sharing system most often used on UNIX systems.
K. An enterprise that sells Internet connectivity and related services.
L. A credit card encryption and verification system combining technology from SEPP and STT.
M. The network layer protocol used natively by Novell Netware.
N. The means by which browsers on the World Wide Web get pages from servers.
O. A specification for authenticating and encrypting HTML requests and responses.
P. An application that maintains a database of file names located on various FTP sites.
Q. A distributed database system that translates hierarchical host names to IP addresses (and vice versa).
R. An extended version of BOOTP that supports more configuration parameters and doesn't require configuring settings in advance for each data link address.
S. A device that segregates two networks based on data link address.
T. An application that opens remote terminal sessions over a TCP/IP network.

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：資管所、工管所
科目：計算機概論

Part II: (35%) The following questions are multiple choice questions. There is only one correct solution. (答錯不倒扣)

1. (1%)Which is an object-oriented language?
   (A). C (B). CGI (C). HTML (D). DEPHI (E). none of these answers.
2. (1%)Which of the following is NOT the key property of object-orientation?
   (A). hashing (B). data abstraction (C). polymorphism (D). inheritance (E). none of these answers.
3. (1%)How many bits would be in the memory of a computer with a 4KB memory?
   (A). 32,768 (B). 4,096 (C). 40,000 (D). 4,000 (E). none of these answers.
4. (1%)Which of the following is NOT the basic information that the CPU must supply to the main memory circuitry to write a value into a memory cell?
   (A). address of the cell (B). type of the value (C). the command to write (D). value to be written (E). none of these answers.
5. (1%)The following two constructs are equivalent:
   while (test) do { actions } vs. do { actions } while (test);
   (A). TRUE (B). FALSE (C) depends on test (D). depends on actions (E). none of these answers
6. (1%)The most appropriate definition for the term "kernel" is:
   (A). the parts of the OS code concerned with security.
   (B). the entire software shipped as OS by the manufacturer.
   (C). program running at all times on the computer.
   (D). architecture dependent parts of the OS code.
   (E). none of these answers.
7. (1%)A processor in the context of computing is:
   (A). A set of instructions to be executed on a computer.
   (B). A program in execution.
   (C). A piece of hardware that executes a set of instructions.
   (D). The main procedure of a program.
   (E). none of these answers.
8. (1%)A multiprogramming system may be defined as one in which:
   (A). Programs are divided into procedures.
   (B). Input is accepted in batches of many jobs.
   (C). Several programs can reside in memory at the same time.
   (D). Many processes may share the same program residing in main memory.
   (E). none of these answers.

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：資管所、工管所
科目：計算機概論

9. (1%)The main distinction between a multiprocessor system and a multiprogramming system is that in a multiprocessor system:
(A). The main storage is shared by several programs.
(B). The input is accepted in batches of many jobs.
(C). Processor time is shared among several processes.
(D). Many processors may be active simultaneously.
(E). none of these answers.

10. (2%)What is the largest numeric value that could be represented with 3 bytes if each digit were coded using one ASCII pattern per byte?
(A). 9999 (B). 999 (C). 16,777,215 (D). 32,768 (E). none of these answers.

11. (2%)What is the value of 5.625 in binary notation?
(A). 101.0101 (B). 101.1001 (C). 110.1010 (D). 101.110 (E). none of these answers.

12. (2%)Suppose you want to complement the 3 middle bits of a 7-bit string while leaving the other 4 bits undisturbed. What mask must you use together with what operation?
(A). 0011100, XOR (B). 0000000, AND (C). 1111111, NOT
(D). 1100011, OR (E). none of these answers.

13. (2%)What is the maximum number of entries that must be interrogated when applying the binary search to a list of 200 entries?
(A). 100 (B). 10 (C). 50 (D). 20 (E). none of these answers.

14. (2%)Let T be a binary tree. If the postorder sequence of T = GDBHIEFCA and the inorder sequence of T = DGBAHEICF. What is the preorder sequence of T?
(A). ABDGCEHIF (B). CEABDIHFG (C). BAFGCHIDE (D). DHIEAFGBC
(E). none of these answers.

15. (2%)Let a=2, b=3, c=4, d=5, e=6. What is the value of the following postfix expression? abc-d +/ea-*c*
(A). 4 (B). 8 (C). 10 (D). 12 (E). none of these answers.

16. (2%)Let R be the number of rows in the matrix. Given a formula for finding the entry in the Ith row and Jth column of a two-dimensional array if it is stored in column major order.
(A). R(J-1)+(I-1) . (B). R(J+1)-(I+1) (C). R(J-I) (D). R(J-1)+(I+1) (E). none of these answers.

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：資管所、工管所
科目：計算機概論

17. (2%)Consider the following program fragment for a single address computer with one accumulator register:

```
LOAD    B
MUL     B
STORE   T1
LOAD    C
DIV     D
SUB     T1
STORE   Z
```

Which arithmetic expression is implemented by the above fragment?

(A). $Z= B^2-D/C$ (B). $Z=T1-C/D$ (C). $Z=C/D-B^2$ (D). $Z=(C/D)^2-B$

(E). none of these answers.

18. (2%)Which of the following is NOT a conflict serializable schedule?

(A). T1: R(x) W(x)
T2: R(x) W(y)

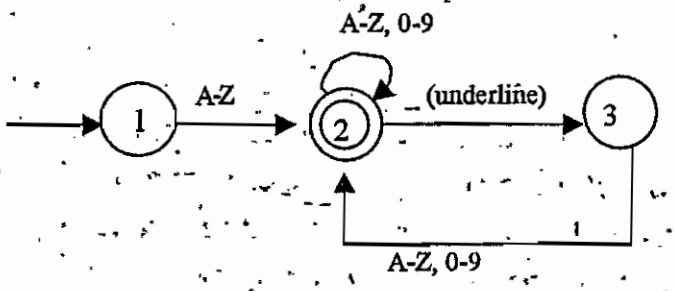
(B). T1: R(x) R(y) W(x) W(y)
T2: R(x) W(x)

(C). T1: R(x) W(x)
T2: R(x) W(y)
T3: R(x) W(y)

(D). T1: R(x) W(x)
T2: R(x) W(y)

(E). none of these answers.

19. (2%)Considering the following finite automation for string's input:



Which of the following string cannot be recognized?

(A). TEST_NO1 (B). MIS87 (C). NOT_A_GOOD_VAR (D). AAA_999

(E). none of these answers.

20. (2%)Considering the following program segment:

```
procedure TTestForm.TestButtonClick(Sender: TObject);
  var J, K: integer;
begin
  K := 3;
  For J := 1 to 5 do
    begin
      K := K + J;
      K := K + 2;
    end;
  J := K*10;
  Y.text := IntToStr(J);
  X.text := IntToStr(K);
end;
```

Give the results of X and Y.

(A). X= 110, Y= 11 (B). X=300, Y=30 (C). X= 220, Y=22 (D). X=280, Y=28

(E). none of these answers.

21. (2%)The major distinction between lightweight(thread) and heavyweight processes centers around:

(A). The amount of memory that must be allocated to the process.

(B). The average number of instructions executed by the process.

(C). The amount of overhead associated with process creation and context switching.

(D).The number of I/O requests made by the process.

(E). none of these answers.

22. (2%)The main difference between binary semaphores and counting semaphores is that:

(A). Binary semaphores can only take the values 0 and 1, while counting semaphores can take any non-negative integer values.

(B). Binary semaphores can only be used to solve problems involving up to two processes sharing the same resource, while counting semaphores can be used to solve problems involving more than two processes sharing the same resource.

(C). Binary semaphores cannot solve all the problems that can be solved by counting semaphores.

(D). Counting semaphores must be controlled by a monitor, while binary semaphores are called directly by user processes.

(E). none of these answers.

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：資管所、工管所
科目：計算機概論

Part III: (20 分)
有關世界網、物件導向語言的是非題。對的打○，錯的打 X。每題兩分。(答錯不倒扣)

___1．物件導向程式的執行效率比 C 的程式要快而且也易於維護。

___2．在 Unix 系統執行的 CGI 程式不能顯示於 Windows95 的瀏覽器中。

___3．Instance variable 是物件儲存資料的地方。

___4．Java 能支援 write once runs everywhere 的主要原因是 Java 有支援許多不同硬體平台的編譯器。

___5．HTML 是一撰寫 WWW 應用軟體的程式語言。

___6．HTML 具備編輯基本的人機界面如按鈕 (button)，選單 (menu)等的功能。

___7．Java 不支援 pointers，而且一個 Java 的 class 最多只能直接繼承一個 super class。

___8．純物件導向的語言無法撰寫遞迴（recursion）的程式。

___9．物件導向的程式語言亦可支援 ADT (abstract data type) 的觀念。

___10．CGI 程式比 Java 更容易撰寫檢查輸入資料是否正確的人機界面。

Part IV: (30 分) 這部份資訊管理研究所考生**不必作答**，工業工程與管理研究所考生**要作答** (答錯不倒扣)

是非題，每題一分

___1．C 語言陣列的大小在程式執行時可以改變

___2．C 語言的陣列在 function 間是用地址傳遞

___3．C 語言的陣列可以存放其他陣列的地址

____4．C 語言的 register 是存取速度最快的變數型態

____5．C 語言的 #define 在程式編譯時會產生適當的機器碼 (machine code)

____6．全域變數 (global variable) 的 scope 可以不包含程式的全部

____7．C 語言的區域變數 (local variable) 與全域變數不可同名

____8．關連式資料庫表格內的資料必須按序排列

____9．Unix 與 Windows/NT 都是支援多人多工的作業系統

____10．Prolog 語言與 Lisp 語言均適合於人工智慧的應用

填空題，每空格兩分。

11．列舉三種合理的 CPU scheduling 的方法。
a. _____ b. _____ c. _____

12．列舉三種排序的演算法。
a. _____ b. _____ c. _____

13．列舉四種能支援搜尋的資料結構。
a. _____ b. _____ c. _____ d. _____

Part V: (30 分) 這部份資訊管理研究所考生**要作答**，工業工程與管理研究所考生**不必作答**。

如果您想使用網路技術（含 www, e-mail 等）設計一可以大幅改進目前文字型 bbs 系統的「超級 bbs」，使得某討論群組的參予者不但能在線上溝通，還能透過網路與居住在地理區域相近或興趣相同的網友進一步的組織成社團，以發揮一般社團組織的功能，請問您有哪些想法與創意？需要使用哪些技術才能達到您的理想？您的答案需包含以下兩點：

a．使用者（包括：管理者，一般用戶）功能設計。15%

b．系統架構應如何？需要哪些技術才能達到您的理想？15%

請最多以一頁的答案紙清楚的表達您的想法，多出的部份不予計分。計分標準包括：表達能力、創意及技術面的合理性與正確性。

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：工管所
科目：微積分與線性代數

解答時，必要之計算或推導過程均需顯示在答案卷上，祝各位成功。

1. (10%) 已知積分 $\int \frac{1}{x^2+5x+6}\,dx = A + B +$ 常數，A=?, B=?

2. (10%) 利用二重積分求曲線 $y=x^2$ 及直線 $x+y-2=0$ 所圍成封閉形狀之面積。

3. (10%) 求 $\lim_{x\to 0}\frac{10^{2x}-2+10^{-2x}}{10^{2x}-10^{-2x}}$ 之值。

4. (10%) 求曲線 $e^x+\cos y-2=0$ 在點 $(0, \frac{\pi}{3})$ 處之切線方程式。

5. (10%) 求積分 $\int x^2 \ln x\,dx$ = ?

6. (10%) Let

$$A=\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

Assuming that det(A) = -7, find

(a) $\det((2A)^{-1})$

(b) $\det\begin{bmatrix} a & g & d \\ b & h & e \\ c & i & f \end{bmatrix}$

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：工管所
科目：微積分與線性代數

7. (10%) Find the distance between these planes:

$$x+2y-2z=3$$
$$2x+4y-4z=7$$

8. (10%) Let $S=\{v_1, v_2, \ldots, v_r\}$ be a set of vectors. Show that if $r > n$, then S is linearly dependent.

9. (10%) Verify that $\text{rank}(A) = \text{rank}(A^T)$

$$A=\begin{bmatrix} 1 & 2 & 4 & 0 \\ -3 & 1 & 5 & 2 \\ -2 & 3 & 9 & 2 \end{bmatrix}$$

10. (10%) Find bases for the eigenspaces of

$$A=\begin{bmatrix} 0 & 0 & -2 \\ 1 & 2 & 1 \\ 1 & 0 & 3 \end{bmatrix}$$

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：工管所
科目：經濟學

Part I. 選擇題(單選，每題四分，答錯倒扣兩分)

1. Which of the following is a positive economic statement?
   a. If the government increases its taxes on gasoline, the price people pay for gasoline will rise.
   b. The government should not let the price of gasoline rise, because this increase would harm poor people.
   c. The government should let the price of gasoline rise, because this would help retired people who own stock in petroleum companies.
   d. the government ought not to control the price of gasoline, because its price should be determined in the free marketplace.
   e. None of the above, because they are all normative in the future.

2. Which of the following is *not* a possible imperfection in the operation of the invisible hand and the price system.
   a. The fact that most people work for business firms rather than being self-employed.
   b. The possibility of a highly unfair distribution of income.
   c. The presence of economy-wide business cycles.
   d. The chance that one firm could gain control over an entire market.
   e. The possibility that price system cannot supply public goods.

3. Which of the following is a relative price?
   a. a price of 15,000 dollars for a Honda Civic
   b. a price of 4 food processors for a microwave oven
   c. a wage of 15 dollars per hour
   d. a price of 2000 yen for a steak dinner
   e. none of the above

4. Presume there is another baby boom, so that the number of babies born dramatically increases. This will ____ the price of diapers and ____ quantity produced.
   a. lower; lower
   b. lower; raise
   c. raise; lower
   d. raise; raise
   e. raise; not change

5. The rule of *caveat venditor* works well when the
   a. good sold can be used by the purchaser in a large of variety of ways.
   b. good is simple but very hazardous (such as pesticide).
   c. buyer has the same information about the good as does the seller.
   d. the seller is much wealthier than the buyer.
   e. seller has much more information about the good than the buyer.

國立雲林科技大學 所別：工管所
八十七學年度研究所碩士班入學考試試題 科目：經濟學

6. Which of the following statements about the short run is *false* ?
   a. Not all inputs can be altered in the short run.
   b. Fixed inputs cannot be changed in the short run.
   c. Additional output can be produced only by altering the amount of variable inputs employed.
   d. The firm pays no fixed costs in the short run.
   e. None of the above; that is, they are all true statements.

7. Which of the following is *not* true about the long run equilibrium in a perfectly competitive industry?
   a. P = MC
   b. P = the minimum long run ATC
   c. MC = MR
   d. P = MR
   e. they are all true in the long-run equilibrium

8. Economic inefficiency is created when
   a. P = MR.
   b. P > MC.
   c. P = MC.
   d. MR = MC.
   e. None of the above.

9. Suppose a star ballplayer's next best alternative job is as an economist with a salary of $30,000. If the ballplayer is paid $1;5000,000, then the ballplayer receives a
   a. pure rent of $1,530,000.
   b. pure rent of $1,470,000.
   c. quasi rent of $1,530,000.
   d. quasi rent of $1,470,000.
   e. none of the above.

10. Which of the following is *not* a final use of GPD?
   a. Consumption expenditures.
   b. Government expenditures for goods and services.
   c. Government expenditures for transfer payments to individuals.
   d. Investment.
   e. Next exports of goods and services.

11. After the self-correcting mechanism has worked, the long-run effect of a demand shock that shifted the AD curve to the right is to _____ the price level and _____ output.
   a. raise; raise
   b. raise; not change
   c. not change; raise
   d. not change; not change
   e. lower; lower

12. Which of the following assets is most liquid?
    a. Shares of stock in IBM.
    b. US government securities.
    c. Land.
    d. Gold.
    e. Currency.

13. Suppose the anticipated inflation rate is 12 percent and the actual inflation rate is 7 percent. The short-run Phillips curve suggests unemployment
    a. falls.
    b. does not change.
    c. rises.
    d. the short-run Phillips curse makes no prediction about this.
    e. the short-run Phillips curve points out that the effect on unemployment depends on what is causing the inflation.

14. Which school thought believes the self-correcting mechanism works slowly?
    a. Keynesian.
    b. Monetarist.
    c. Rational expections.
    d. Keynesian and monetarist only.
    e. All schools believe the self-correcting mechanism is slow.

15. Monetarists contend that a cause of the Great Depression was
    a. the doubling of reserve requirements by the Fed in 1937.
    b. the large tax increase passed in 1932 and 1937.
    c. New Deal policies that raised the monopoly power of firms and unions.
    d. the Fed allowing the money supply to fall by 25 percent between 1929 and 1933.
    e. all of the above.

16. The law of comparative advantage suggests all of the following *except*
    a. nations and individuals tend to produce only a few items.
    b. the United States tends to export new products requiring a lot of research and development.
    c. trade barriers harm the people within the nation erecting the barriers.
    d. nations will be better off it they protect their industries that have a comparative disadvantage.
    e. nations tend to export goods in which they have an abundance of the necessary factors of production.

17. Which of the following statements about fixed exchange rate system is *not* correct?
    a. The government may run out of foreign exchange while attempting to fix its exchange rate.
    b. Fixed exchange rates refer to the case where the government pegs the exchange rate at a fixed level.
    c. If a country lowers the value of its currency, it has devalued the currency.
    d. The Bretton Woods system was an example of a fixed exchange rate system.
    e. They are all correct.

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：工管所
科目：管理實務

1. 請說明全面品質管理的意義，寫出你(妳)所在的工作岡位上之內部與外部顧客，並請說明讓內部與外部顧客滿意的努力方向、執行步驟及評估方法。 50%

2. 賣場的管理類似倉庫管理，只是擺設不同，另外客人是付錢買東西而非領料。而目前街上的 7-11 所販賣商品的種類及數目皆不是從前傳統雜貨店所能經營的，主要原因是電腦化管理及自動化設備的普及。試說明賣場電腦化管理的流程及相關自動化的設備。說明每一流程之管理目標及其可達成目標的理由。 50%

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：工管所
科目：統計學

1. (10%) An urn contains 17 balls marked LOSE and 3 balls marked WIN. You and an opponent take turns selecting at random a single ball from the urn without replacement. The person who selects the third WIN ball wins the game. It does not matter who selected the first two WIN balls..
   (a) If you draw first, find the probability that you win the game on your fourth draw.
   (b) If you draw first, find the probability that you win the game.

2. (10%) A Bayesian approach can be used to revise probabilities that a prospect field will produce oil. In one case, geological assessment indicates a 25% chance that the field will produce oil. Further, there is an 80% chance that a particular well will strike oil given that oil is present in the prospect field.
   (a) Suppose two wells are drilled on the field and they come up dry, what is the probability that the field will produce oil?
   (b) The oil company would like to keep looking as long as the chances of finding oil are greater than 1%. How many dry wells must be drilled before the field will be abandoned?

3. (10%) Let X_1, X_2, X_3 be mutually independent random variables with Poisson distributions having means 2, 1, 4, respectively.
   (a) Find the moment-generating function of the sum $Y = X_1 + X_2 + X_3$.
   (b) Compute $P(3 \le Y \le 9)$.

4. (10%) Let X_1, X_2 be a random sample of size 2 from the distribution with the binomial p.d.f.

$$f(x) = \binom{2}{x}\left(\frac{1}{3}\right)^{x}\left(\frac{2}{3}\right)^{2-x}, \qquad x = 0, 1, 2.$$

   (a) Find the joint p.d.f. of $Y = X_1$ and $W = X_1 + X_2$. (4%)
   (b) Determine the marginal p.d.f. of W. (4%)
   (c) Compute the correlation coefficient of Y and W. (2%)

5. (10%) Let $X_1, X_2, \ldots, X_n$ be a random sample of size n from the distribution with probability density function $f(x;\theta) = \theta\, x^{\theta-1}$, $0 < x < 1$, $0 < \theta < \infty$.
   (a) Find the maximum likelihood estimator of θ.
   (b) Find the estimator of θ using the method of moments.

國立雲林科技大學 所別：工管所
八十七學年度研究所碩士班入學考試試題 科目：統計學

6.(10%) The length of life of brand A light bulbs is assumed to be N(μ_a, 784). The length of life of brand B light bulbs is assumed to be N(μ_b, 627) and independent of that of A. If a random sample of 56 brand A light bulbs yielded a mean of 937.4 hours and a random sample of 57 brand B light bulbs yielded a mean of 988.9 hours, find a 90% confidence interval for μ_a-μ_b.

7.(10%) A consumer-research group is interested in testing an automobile manufacturer's claim that a new economy model will travel at least 25 miles per gallon of gasoline.

(a) With a 0.02 level of significance and a sample of 30 cars, what is the rejection rule for the test? Assume that σ is 3 miles per gallon.

(b) Compute the Type II error probabilities if the actual mileage is 23, 24, and 25.5 miles per gallon, respectively and draw the power curve for this test.

8.(10%) A 95% confidence interval for a population mean is reported to be 122 to 130. If the sample mean is 126 and the sample standard deviation is 16, what sample size was used in this study? How large a sample is required in order to reduce the sampling error to 2 or less?

9. (10%) Each of two comparable classes of 15 students responded to two different methods of instructions with the following scores on a standardized test:

Class A:	91	42	39	62	55	82	67	44	51	77
	61	52	76	41	59					
Class B:	80	71	55	67	61	93	49	78	57	88
	79	81	63	51	75					

Use a chi-square test with $\alpha = 0.05$ to test the equality of the distribution of test scores by dividing the combined sample into three equal parts (low, middle, high).

10. (10%) In an experiment, eighteen numerical values are obtained. The factor that may affect the experimental output has three levels. The analysis of variance (ANOVA) procedure is conducted after the experiment. By examining the ANOVA table, the estimated value of variance for random error is 28.7. Computational result shows that the total sum of squares is 946.

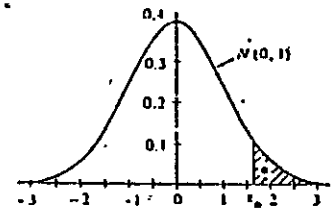
(a) Please write down the complete ANOVA table, including SOURCE, DEGREE OF FREEDOM (DF), SUM OF SQUARE (SS), MEAN SQUARE (MS), and F value.

(b) What are the assumptions on the data when using ANOVA?

國立雲林科技大學
八十七學年度研究所碩士班入學考試試題

所別：工管所
科目：統計學

The Normal Distribution

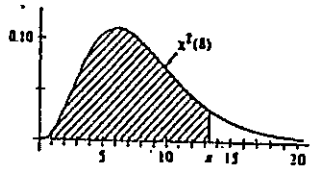


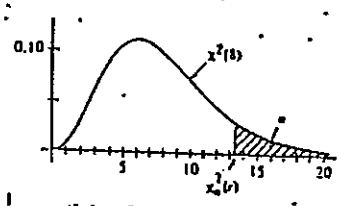
$P(Z > z_\alpha) = \alpha$

$P(Z > z) = 1 - \Phi(z) = \Phi(-z)$

z_α	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
0.7	0.2470	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1891	0.1567
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0195	0.0485	0.0475	0.0165	0.0155
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002

The Chi-Square Distribution





$$P(X \le x) = \int_0^x \frac{1}{\Gamma(r/2)2^{r/2}} w^{r/2-1} e^{-w/2}\, dw$$

	$P(X \le x)$							
	0.010	0.025	0.050	0.100	0.900	0.950	0.975	0.990
r	$\chi^2_{0.990}(r)$	$\chi^2_{0.975}(r)$	$\chi^2_{0.950}(r)$	$\chi^2_{0.900}(r)$	$\chi^2_{0.100}(r)$	$\chi^2_{0.050}(r)$	$\chi^2_{0.025}(r)$	$\chi^2_{0.010}(r)$
1	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635
2	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210
3	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.34
4	0.297	0.484	0.711	1.064	7.779	9.488	11.14	13.28
5	0.554	0.831	1.145	1.610	9.236	11.07	12.83	15.09
6	0.872	1.237	1.635	2.204	10.64	12.59	14.45	16.81
7	1.239	1.690	2.167	2.833	12.02	14.07	16.01	18.48
8	1.646	2.180	2.733	3.490	13.36	15.51	17.54	20.09
9	2.088	2.700	3.325	4.168	14.68	16.92	19.02	21.67
10	2.558	3.247	3.940	4.865	15.99	18.31	20.48	23.21
11	3.053	3.816	4.575	5.578	17.28	19.68	21.92	24.72
12	3.571	4.404	5.226	6.304	18.55	21.03	23.34	26.22
13	4.107	5.009	5.892	7.042	19.81	22.36	24.74	27.69
14	4.660	5.629	6.571	7.790	21.06	23.68	26.12	29.14
15	5.229	6.262	7.261	8.547	22.31	25.00	27.49	30.58
16	5.812	6.908	7.962	9.312	23.54	26.30	28.84	32.00
17	6.408	7.564	8.672	10.08	24.77	27.59	30.19	33.41
18	7.015	8.231	9.390	10.86	25.99	28.87	31.53	34.80
19	7.633	8.907	10.12	11.65	27.20	30.14	32.85	36.19
20	8.260	9.591	10.85	12.44	28.41	31.41	34.17	37.57
21	8.897	10.28	11.59	13.24	29.62	32.67	35.48	38.93
22	9.542	10.98	12.34	14.04	30.81	33.92	36.78	40.29
23	10.20	11.69	13.09	14.85	32.01	35.17	38.08	41.64
24	10.86	12.40	13.85	15.66	33.20	36.42	39.36	42.98
25	11.52	13.12	14.61	16.47	34.38	37.65	40.65	44.31
26	12.20	13.84	15.38	17.29	35.56	38.88	41.92	45.64
27	12.88	14.57	16.15	18.11	36.74	40.11	43.19	46.96
28	13.56	15.31	16.93	18.94	37.92	41.34	44.46	48.28
29	14.26	16.05	17.71	19.77	39.09	42.56	45.72	49.59
30	14.95	16.79	18.49	20.60	40.26	43.77	46.98	50.89
40	22.16	24.43	26.51	29.05	51.80	55.76	59.34	63.69
50	29.71	32.36	34.76	37.69	63.17	67.50	71.42	76.15
60	37.48	40.48	43.19	46.46	74.40	79.08	83.30	88.38
70	45.44	48.76	51.74	55.33	85.53	90.53	95.02	100.4
80	53.34	57.15	60.39	64.28	96.58	101.9	106.6	112.3