科目：統計學
考試時間：100 分鐘

系所：
　資訊管理學系碩士班甲組
本科原始成績：100 分

是否使用計算機：是

I. True/False Questions (If the answer is correct, please mark **O**, otherwise, mark **X**.) (22%)

1. For every set of data the value of the median will always be one of the original items of data.

2. If A and B are both nonempty events of a sample space S and A and B are mutually exclusive, then A and B are dependent.

3. If x is a normally distributed random variable with a mean of μ and a standard deviation of σ and if x converts to the standard score z, then given any three of the values of x, μ, σ, and z, we can always find the fourth value.

4. The t-distribution approaches the normal distribution as the number of degrees of freedom decreases.

5. If the random variable Z is the standard normal score, then $Z_{0.65} = -Z_{0.35}$.

6. The ANOVA test assumes that you sample from normal populations with homogeneous variances.

7. Sample means become less variable as the sample size decreases.

8. When the F test is used to test for the equality of a set of population means, if the null hypothesis is rejected then all of the population means are declared to differ from one another.

9. In constructing a confidence interval for the mean difference in paired data we see that as the sample size increases the width of the interval also increases.

10. As the sample size increases, the sampling distribution of the sample mean from a normal distribution has a normal curve that becomes more peaked.

11. Every binomial distribution may be approximated reasonably by an appropriate normal distribution.

II. Multiple Choice Questions (Please only choose **one** best answer for each question.) (22%)

1. Which of the following is **not** a characteristic of a binomial probability experiment?
   (A) Each trial has two possible outcomes: success and failure.
   (B) P(success)=1-P(failure)
   (C) The binomial random variable x is the count of the number of trials that occur.
   (D) Trials are independent.
   (E) The result of one trial does not affect the probability of success on any other trial.

科目：統計學
考試時間：100 分鐘

系所：
　資訊管理學系碩士班甲組
本科原始成績：100 分

是否使用計算機：是

2. In the *p*-value approach to hypothesis testing we reject the null hypothesis if the:

   (A) *p*-value $> \alpha$.

   (B) *p*-value $\geqq \alpha$.

   (C) *p*-value $< \alpha$.

   (D) *p*-value $\leqq \alpha$.

   (E) *p*-value $\neq \alpha$.

3. We will want to fail to reject the null hypothesis in a chi-square test comparing observed to expected frequencies whenever:

   (A) the observed frequencies are each approximately equal to their corresponding expected frequency.

   (B) the observed frequencies are significantly greater than the expected frequencies.

   (C) the observed frequencies are considerably smaller than the expected frequencies.

   (D) all of the above.

   (E) none of the above.

4. Suppose we select a random sample of size *n* from a normal population with a mean of μ and a standard deviation of σ and suppose *k* is some number greater than μ. Which of the following is true?

   (A) $P(\bar{x} < k) > P(x < k)$.

   (B) $P(\bar{x} < k) < P(x < k)$.

   (C) $P(\bar{x} < k) = P(x < k)$.

   (D) $P(\bar{x} > k) > P(x > k)$.

   (E) None of the above can be determined without knowing specific values for *n*, μ, σ, and *k*.

5. The following is the null hypothesis in a hypothesis test for a multinomial experiment:

   H_0: P(*A*)=0.15, P(*B*)=0.25, P(*C*)=0.35, and P(*D*)=0.25.

   Which of the following is the appropriate alternative hypothesis?

   (A) H_a: P(*A*)=0.25, P(*B*)=0.25, P(*C*)=0.25, and P(*D*)=0.25.

   (B) H_a: P(*A*)$\neq$0.15, P(*B*)$\neq$0.25, P(*C*)$\neq$0.35, and P(*D*)$\neq$0.25.

   (C) H_a: P(*A*)$\neq$0.15, P(*B*)=0.25, P(*C*)$\neq$0.35, and P(*D*)=0.25.

   (D) H_a: the probabilities are distributed differently from those listed in H_0.

   (E) H_a: one of the probabilities listed in H_0 is incorrect.

科目：統計學
考試時間：100 分鐘
系所：
資訊管理學系碩士班甲組
本科原始成績：100 分
是否使用計算機：是

6. For a binomial distribution with five trials and 20% probability of success per trial, what number of successes in the five trials has the highest probability?

    (A) 1

    (B) 2

    (C) 3

    (D) 4

    (E) 5

7. If you obtain a negative value for the chi-square statistic in a hypothesis test, then

    (A) you will automatically rejected H_0.

    (B) you will automatically fail to reject H_0.

    (C) all expected frequencies were greater than the corresponding observed frequencies.

    (D) all observed frequencies were greater than the corresponding expected frequencies.

    (E) a mistake occurred in calculation.

8. In comparing Student's t-distribution to the standard normal distribution, we see that Student's t-distribution is:

    (A) less peaked and thinner at the tails.

    (B) less peaked and thicker at the tails.

    (C) more peaked and thinner at the tails.

    (D) more peaked and thicker at the tails.

    (E) peaked the same but thicker at the tails.

9. Which of the following is the probability of having the computed value of the test statistic fall in the noncritical region when the null hypothesis is true?

    (A) α

    (B) $1-\alpha$

    (C) β

    (D) $1-\beta$

    (E) $1-(\alpha+\beta)$

10. If the random variable x is normally distributed with a mean of μ and a standard deviation of σ, then $P(\mu+\sigma< x <\mu+2\sigma)=$

    (A) $2[P(\mu< x <\mu+\sigma)]$.

    (B) $P(\mu< x <\mu+\sigma)$.

    (C) $P(\mu-2\sigma< x <\mu-\sigma)$.

    (D) $P(\mu+0.5\sigma< x <\mu+1.5\sigma)$.

    (E) None of these.

科目：統計學
考試時間：100 分鐘

系所：
資訊管理學系碩士班甲組
本科原始成績：100 分

是否使用計算機：是

11. Which of the following probability experiments would not result in a discrete random variable?

(A) Observing the number of times a coin is tossed before obtaining heads
(B) Observing the time required for a light bulb to burn out once it is turned on
(C) Observing the number of hearts when five cards are randomly selected from a deck
(D) Observing the number of telephone calls coming into a switchboard in one hour
(E) Observing the number of defective components in a case of 100 components

III. Calculation Questions (56%)

1. A survey organization asked respondents' views on the probable future direction of the economy and on how they voted for president in the last election. The following table shows the fractions of respondents in nine classifications. (10%)

	View on Economy		
	Optimistic	Pessimistic	Neutral
Voted for the president	0.20	0.08	0.12
Voted against the president	0.08	0.15	0.12
Did not vote	0.07	0.08	0.10

(a) What is the probability that a randomly chosen respondent voted for the president?
(b) What is the probability that a randomly chosen respondent is pessimistic about the economy?
(c) What is the conditional probability that a respondent who voted for the president will be pessimistic about the economy?
(d) What is the conditional probability that a respondent who is pessimistic about the economy voted for the president?
(e) Are views on the economy independent of how respondents voted?

科目：統計學
考試時間：100 分鐘

系所：
資訊管理學系碩士班甲組
本科原始成績：100 分

是否使用計算機：是

2. A farmer must determine whether to plant corn or wheat. If he plants corn and the weather is warm, he earns $8000; if he plants corn and the weather is cold, he earns $5000. If he plants wheat and the weather is warm, he earns $7000; if he plants wheat and the weather is cold, he earns $6500. In the past, 40% of all years have been cold and 60% have been warm. Before planting, this farmer can pay $600 for an expert weather forecast. If the year is actually cold, there is a 90% chance that the forecaster will predict a cold year. If the year is actually warm, there is an 80% chance that the forecaster will predict a warm year. How can this farmer maximize his expected profits? (10%)

3. Please find the values of (a) to (e) in the following ANOVA. (10%)

Source	SS	df (degree of freedom)	MS	F*
Method	(a)	4	50	(e)
Error	(b)	20	(d)	
Total	450	(c)		

4. A certain washing machine manufacturer (brand 1) claims that the fraction p_1 of his washing machines that need repairs in the first five years of operation is less than the fraction p_2 of another brand (brand 2). To test this claim, we observe 200 machines of each brand, and find that 21 and 37 machines need repairs for brand 1 and brand 2 respectively. Do these data support the manufacturer's claim? Use $\alpha = 0.05$. (5%)

5. Consider the following null and alternative hypotheses.
$H_0 : p = 0.82$ versus $H_a : p \neq 0.82$
A random sample of 600 observations taken from this population produced a sample proportion of 0.855. Please answer the following questions: (6%)
(1) If this test is made at the 2% significance level, would you reject the null hypothesis?
(2) What is the probability of making a Type I error in the above question?

6. In order to understand the effects of the four dimensions such as "online quality and

科目：統計學
考試時間：100 分鐘

系所：
　　資訊管理學系碩士班甲組

本科原始成績：100 分

是否使用計算機：是

information safety" (D_1), "customers service management" (D_2), "advertising mails management"(D_3) and "extra function" (D_4) on customer satisfaction (CS) of the virtual community, the researchers analyze the collected data by using the multiple regression analysis and the research results are shown in the following table.

Dependent Variable: CS

Source	Degree of freedom	Sum of square	Mean of square	F value	p-value
Model	4	79.237	19.809	13.896	0.000
Error	223	317.903	1.426		
Corrected Total	227	397.140			

Parameter	Estimate	t value	p-value	Standard error of estimate
Intercept	2.408	4.505	0.000	0.535
D_1	0.485	5.500	0.000	0.088
D_2	0.134	2.255	0.025	0.059
D_3	-0.006	-0.094	0.926	0.061
D_4	-0.019	-0.260	0.795	0.074

Please answer the following questions: (15%)

(1) What is the sample size?

(2) Find the R-Square.

(3) Please not only write down the regression model but also explain the meaning of this model.

(4) Do the four dimensions have significant effects on customer satisfaction at $\alpha=0.01$ level in this model? Explain.

(5) Which dimension(s) you will delete from this model? Explain.

標準常態分配值：$Z_{0.005}=2.575$, $Z_{0.01}=2.33$, $Z_{0.025}=1.96$, $Z_{0.05}=1.645$, $Z_{0.1}=1.28$

F 分配 $F_\alpha(\nu_1, \nu_2)$：$F_{0.05}(2,12)=3.89$, $F_{0.05}(3,12)=3.49$, $F_{0.05}(4,12)=3.26$, $F_{0.05}(2,13)=3.81$, $F_{0.05}(3,13)=3.41$, $F_{0.05}(4,13)=3.18$

t 分配右尾百分點 $t_\alpha(d.f.)$：$t_{0.05}(12)=1.782$, $t_{0.05}(13)=1.771$, $t_{0.05}(14)=1.761$, $t_{0.05}(15)=1.753$, $t_{0.05}(16)=1.746$

科目：資訊管理
考試時間：100 分鐘

系所：
資訊管理學系碩士班甲組
本科原始成績：100 分

是否使用計算機：否

1. Please translate and explain the following terminologies. (40%)
   （1） CMMI
   （2） Digital Divide
   （3） EIP
   （4） e-Marketplace
   （5） Network externality
   （6） Podcasting
   （7） Standard War
   （8） VoIP
   （9） WEB2.0
   （10） WIKI

2. What kinds of structural organization changes that are enabled by information technology? Please draw the model according to risks and rewards.（10%）

3. In the information age, businesses have now offered several positions that are MIS related, please list three titles and depict their job description.（10%）

4. In the data protection aspects, there are opt-in mode and opt-out mode, please（1）explain these two approaches respectively;（2）which approach can provide better protection when it is permissible to send Internet users commercial information, please specify your explanation.（10%）

5. Recently there has an IT hot news concerning the Microsoft pursues Yahoo! takeover. Please（1）discuss the insight of this news;（2）if this event came true, what would be the impact and influence;（3）being a researcher, please propose the possible research issues from this event. （15%）

6. Please translate the following article abstract entitled "An Integrated Model of Consortium-Based E-Business Standardization: Collaborative Development and Adoption with Network Externalities", which has published in the top MIS journal, Journal of Management Information Systems (23:4), Spring 2007. （15%）

   E-business standards are critical for electronic interorganizational transactions. In many industries, firms develop e-business standards

國立高雄大學九十七學年度研究所碩士班招生考試試題

科目：資訊管理
考試時間：100 分鐘

系所：
資訊管理學系碩士班甲組
本科原始成績：100 分

是否使用計算機：否

collaboratively in a standard consortium. They can choose to become a leading developer, a passive adopter, or a nonadopter. To capture firms' strategic choices at the development stage and the adoption stage, which are related due to the double-sided interactions between the two stages, we propose an integrated model of consortium-based e-business standardization. We find that firms' payoffs from standard adoption increase with the intrinsic value of the standard, but developers' benefits increase faster than passive adopters' benefits. The model examines the value of passive adopters to the standard development via network externalities, even though passive adopters do not contribute directly in the consortium. We find that passive adopters do not always exist. There are two possible equilibria for the endogenous formation of the developer network and the adopter network, one without passive adopters and one with passive adopters. How external conditions affect the endogenous formation of the consortium depends upon whether there are passive adopters in the equilibrium. Based on our analysis, we recommend strategies to e-business standard consortia to motivate firms' participation and enhance social welfare created by the standard.

1. Please write programs using C language to compute the sequence $\{A_n\}$:

    $A_0 = 1.0$

    $A_1 = 2.0$

    $A_3 = 3.0$

    $A_n = A_{n-1} + \log(A_{n-2}) + A_{n-3}$ 　　　if 　 $n > 3$

    A. Using the recursive function call to compute the first 10 item of this sequence **(8 %)**

    B. Please write a program to find the minimum integer M such that $A_M > 10000$ **(8 %)**

2. A *perfect number* is a positive integer N such that the sum of all proper divisors of N equal to itself, for example:

    6 　　=　　1+2+3

    28 　　=　　1+2+4+7+14

    496 　　=　　1+2+4+8+16+31+62+124+248

    Please use C Language to design following programs:

    A. Design a function *Divisors* input a positive integer argument and return the all proper divisors (Please using ﹝ﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐﾐ ointer? not ﾐﾐﾐﾐﾐ rray ﾐﾐ data format to declare your function). **(7 %)**

    B. Using the result of A, finds out all perfect number between 1 and 1000. **(5 %)**

    C. Analyze the complexity of your algorithm. **(3 %)**

3. The College of Management of NUK using network address range is 140.127.220.0/24. If your desktop PC is in this network range and using DHCP to get an IP address dynamically from a local network DHCP server, please consider 1).Can you connect to Network Neighborhood. 2).Can you use Outlook to send an Email 3).Can you use MSN to send or receive your friend message.　 4). Can you using the browser to see the web page of http://140.127.220.122. Please answer at the following situations:

    A. Please describe what will happen in detail, when the DHCP Server has problem **(5 %)**

    B. Please describe what will happen in detail, if the DNS Server has problem **(5 %)**

    C. Please s describe what will happen in detail, if the Default Gateway has problem **(5 %)**

    (*Note: in the situations A, B and C please answer these questions independently)

4. The **PHP**, **Java** and **Java Script** are three kinds of techniques for implement in web programming. Please explain the different and compare these with each other. **(8 %)**

5. Please explain following computer terminologies:
   A. Virtue Machine **(3 %)**
   B. Samba **(3 %)**
   C. RAID **(3 %)**
   D. GPS **(3 %)**
   E. GPRS **(3 %)**

6. Please description of the following computer network protocol :
   A. ICMP **(3 %)**
   B. IGMP **(3 %)**
   C. ARP **(3 %)**
   D. What different of ICMP and IGMP, what the effect of the ICMP transformation if we using the firewall to drop all the IGMP package in some network **(4 %)**
   E. What is the ARP Spoofing attack? What happen if we using the firewall to drop the all ARP packages in some network **(5 %)**

7. Please explain the following questions:
   A. Why database need index? **(3 %)**
   B. What is Primary key, Foreign key **(4 %)**
   C. Consider following relational schema: **(6 %)**

Qid	Sid	No	Title	DesignerID	DesignerName	Desc	No	Content	{Date}

   Qid→{Title, DesignerID, DesignerName}

   {Qid, Sid}→{Desc, No}

   {Qid, Sid, No} → Content

   ● Please decomposing as 1NF(Normal Form) , but not 2NF
   ● Please decomposing as 2NF, but not 3NF
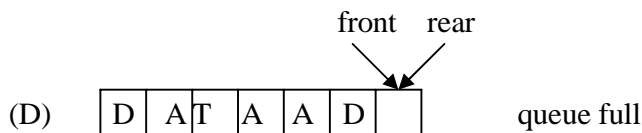   ● Please decomposing as 3NF
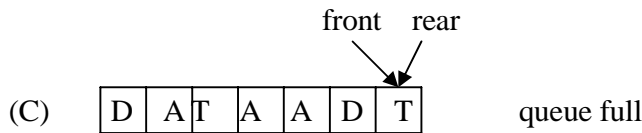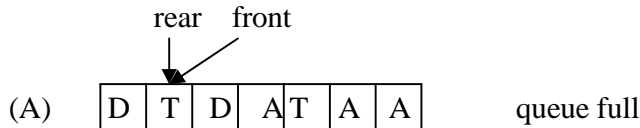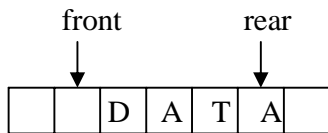
科目：資料結構
考試時間：100 分鐘
系所：
　　資訊管理學系碩士班乙組
本科原始成績：100 分
是否使用計算機：否

Multiple Choices(選擇題，每題 4 分，共 40 分)

1. Given a 4 x 4 x 4　3-dimensional array, how many elements will be at the same position for row-majoring and column-major arrangements?
   (A)　4　(B)　8　(C)　12　(D)　16

2. What is the *posfix* expression of the following *prefix* expression:
   + ? / abc *d**efg ?
   (A) ab / c ? def *g**+　　　　　　　(B) abc / ? def*g**+
   (C) a / bc ? def*g**+　　　　　　　(D) ab/c ? de*f*g*+

3. Using a stack and operations: *push*, *pop*, *no-op*.　Which result can NOT be obtained if we input the following sequence 1, 2, 3, 4, 5, 6 sequentially?
   (A) 324156　　　(B) 132546　　　(C) 235146　　　(D) 325641

4. Given a circular queue as follow, what is the result of inserting A, D, T?

   front　　　rear

   | | | D | A | T | A | |

   (A)
   rear　front

   | D | T | D | A | T | A | A |　　queue full

   (B)
   rear　front

   | D | | D | A | T | A | A |　　queue full

   (C)
   front　rear

   | D | A | T | A | A | D | T |　　queue full

   (D)
   front　rear

   | D | A | T | A | A | D | |　　queue full

5. It requires accessing three pointers to *invert* a <u>*singly*</u> *linked list*. How many pointers are required to *invert* a <u>*doubly*</u> *linked list*?
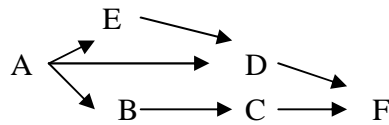   (A)　1　(B)　2　(C)　3　(D)　4

6. Which of the following time complexity is NOT *0(1)* ,

   (A) Insert in unsorted array

   (B) Find Min in balanced tree(red-black tree)

   (C) Member in priority queue using a heap

   (D) Find Min in sorted linked list

7. How many *spanning trees* does a five node complete graph have?

   (A) 120　(B) 60　(C) 48　(D) 24

8. What is the *topological order* of the following directed acyclic graph?

   (A) AEBDCF　(B) ABCEDF　(C) ABEDCF　(D) AEDFBC

9. L_1 and L_2 are 5-element and 4-element sorted lists respectively, what is the minimum number of comparisons required to merge L_1 and L_2 using *merge sort*?

   (A)　1　(B)　4　(C)　5　　(D)　6

10. Using *closed hash table* and hash function *h(i) = i MOD 5* with 5 buckets, how many *probes* are required if 13, 28, 35, 4, 20 are inserted sequentially using linear resolution of collision?

    (A)　1　(B)　2　(C)　3　(D)　5

問答題，每題 15 分，共 60 分

11. Write a *recursive* Java or pseudo code to find *the number of nodes with two children*, given a binary tree *t*.

12. The method *contains()* scans an array to determine if the argument `item` is in the list.　The method returns true if a match occurs and false otherwise.　The following implementation works but is not a good solution.

```
public static boolean contains(int[] arr, int item)
{
    boolean itemFound = false;
    for (int i = 0; i < arr.length; i++)
        if (arr[i] == item)
            itemFound = true;
    return itemFound;
}
```

    (a) Create a better implementation of the method.

    (b) Use Big O measure of running time to indicate why you have a more efficient solution.

科目：資料結構
考試時間：100 分鐘

系所：
　資訊管理學系碩士班乙組
本科原始成績：100 分

是否使用計算機：否

13. Implement a method, **bottom()**, that returns the element on the bottom of a nonempty stack.

14. The file "letters.txt? contains the following data:　beabdcbacaacbdecdeaaeb
    (a) Construct a Huffman tree for the file.
    (b) Give the bit codes for 'a', 'b', 'c',　? and 'e'.