國立中山大學99學年度碩士班招生考試試題

科目：計算機概論【資管系碩士班甲組】

(A) 共 5 題複選題，每題 5 分

1.系統架構 (System Architecture) 裡最重要的 2 個觀點是：

A. 資料觀點 (Data View)
B. 類別觀點 (Class View)
C. 設計觀點 (Design View)
D. 行為觀點 (Behavior View)
E. 時間觀點 (Time View)
F. 結構觀點 (Structure View)

2. 下列邏輯式子 (Logical Formula) 何者為真：

A. P or (not (P and Q))
B. P or Q or R
C. (P and Q) and (not (P or Q))
D. not (P or Q) or (not P and Q)
E. (P or (Q or R)) implies ((P or Q) and (P or R))
F. P or (P and Q)

3. 非程序 (Non-Procedural) 類的程式語言包括：

A. Pascal
B. Prolog
C. LISP
D. Basic
E. COBOL
F. Fortran

4. 下列何者相當於類別庫 (Package)：

A. 類別 (Class)
B. 標籤引頭 (Tag Prefix)
C. 標籤名稱 (Tag Name)
D. 擷法 (Method)
E. 名稱空間 (Name Space)
F. 副程式 (Subprogram)

5. 請問以下哪些通訊協定是運用於網際網路的電子郵件系統?

A. HTTP
B. SMTP
C. POP3
D. IMAP

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(B) 共 6 題單選題，每題 5 分

6.
```
class Person{
  public:
    Person(int);
    int x;};
Person:: Person (int a) {x = a;}
class Employee : public Person{
  public:
    Employee(int =30, int =40);
     int y;};
    Employee:: Employee (int b, int c) : Person (b) {y = c;}
main(){
    Employee e1(20);}
```

上列 C++ 程式執行結束後 e1.x 和 e1.y 的值是什麼？

A. 20 和 20
B. 20 和 30
C. 20 和 40
D. 30 和 20
E. 30 和 30
F. 40 和 40

7. 軟體黑箱測試 (Black-Box Testing) 不包括：

A. 等價分割法
B. 背對背測試法
C. 邊界值分析法
D. 分枝涵蓋法
E. 因果圖解法
F. 比較測試法

8. 在 Web 程式設計裡，一個 Web Service 裡會擁有很多個：

A. 類別 (Class)
B. 服務 (Service)
C. 操作 (Operation)
D. 結合 (Association)
E. 連結 (Connection)
F. 物件 (Object)

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9. 下列 Visual Basic 語言片段程式的執行結果為何?

```
X = 0
For N = 1 to 50
  If  N Mod 15 = 0 Then
      X = X + 1
  End if
Next N
Print "X="; X
```

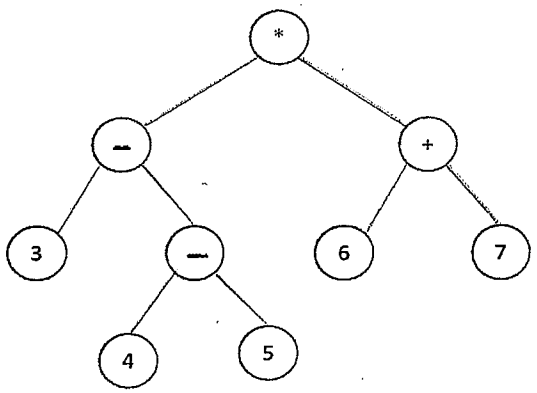
A. X = 5　B. X = 15　C. X = 3　D. X = 50

10. 下列 C 語言片段程式的執行結果為何?

```
#include<stdio.h>
main()
{ int x1=69, x2=5;
 While(x1) {x1/=x2++;}
 Printf("%d\n", x2)};
}
```

A. x2 = 9　B. x2 = 7　C. x2 = 6　D. x2 = 8

11. 下面這個兩元樹 (Binary Tree) 所代表的算術運算式為何?



A. 3-4-5*6+7　B. (3-(4-5))*(6+7)　C. (3-4-5)*(6+7)　D. 3-(4-5)*(6+7)

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(C) 共 3 題填空題，每題 5 分

12. 整理資料 (Data) 的工具稱作資料庫 (Database) ，整理軟體 (Software) 的工具稱作_____。

13.
```
#include <iostream.h>
class Time{
  public:
    Time (int = 11, int =22, int = 33);
    int hour;
    int minute;
    int second;};
 Time:: Time (int hr, int min, int sec)
  {  hour = hr;
     minute = min;
     second = sec;}
main(){
  Time t1 (8);
  cout << t1.hour << ' ' << t1.minute << ' ' << t1.second << endl;}
```
上列 C++程式執行結束後，會列印出：_____。

14. 開放系統連接的軟體結構總共有七個層級，每一層級都算是一個結構元素，它們分別為實體層(Physical Layer)、資料鏈結層(Data Link Layer)、網路層(Network Layer)、_____、交談層(Session Layer)、展現層(Presentation Layer)、應用層(Application Layer)等等。

(D) 共 5 題問答題，共 30 分

15. (5 分) 請解釋 Cloud computing 的意涵與特性。
16. (5 分) 請說明網路服務 Podcast 的主要運作方式及應用。
17. (5 分) 請解釋資訊軟體界的最新發展趨勢 SaaS 的全名與意涵。
18. (5 分) 請解釋 **solid-state drive (SSD)** 意涵與特性。
19. (10 分) 在一個電腦系統中有四個型態相同的資源 (resources) 由三個電腦程序 (Processes) 所共享, 每一個電腦程序最多只需要兩個資源來完成工作. 請證明這是一個 deadlock free 的系統.

國立中山大學99學年度碩士班招生考試試題

科目：管理資訊系統【資管系碩士班甲組】

1. Apple 的電腦產品 (Mac) 品質優良，但多數人還是選擇使用 PC，請用網路外部性的概念解釋此現象。(15%)

2. 研究指出「信任」在網路(線上)交易中扮演重要的角色，請列出並說明 5 個提升消費者信任的方法。(15%)

3. Web 2.0 的來臨，似乎已經是個正在發酵的社會風潮。請回答下列 Web 2.0 之問題：(20%)
   (1) 何謂 Web 2.0？請列出 5 種 Web 2.0 網站類型，並各別舉例一個知名網站(平台)。(10%)
   (2) 如何將 Web 2.0 應用在企業內部？請列出並敘述 3 種應用方式。(10%)

4. 企業在評估 IT 應否投資時，一定會在「可行性分析」階段中，預估其潛在的成本與潛在效益價值(potential value)，必定是預估效益大於預估成本後才會決定導入；然而實際上最後 IS 導入的結果常會令人大失所望，實際發生的成本常常遠遠大於實際產生的效益(realized value)，而使企業遭受到龐大的損失，這種潛在價值的高估與潛在成本的低估都是資訊系統導入最大的失敗原因，請問就你的了解，有那些主要的障礙因素會令企業高估 IS 導入的效益與低估導入成本?(25%)
   (hint: 可從 1.IT 投資潛在效益的評估障礙與 2.IT 投資價值實現的轉換障礙兩方面來思考)

5. B2B EC 的主要經營模式大致上可分爲兩種，一種是公開、多對多現貨買賣爲主的所謂電子市場(e-Marketplace)另一種是以某一大企業爲主與少數幾家供應鏈上的策略聯盟夥伴所形成一個以協調合作、分享資訊爲主的封閉式的、私有的供應鏈網路，或稱私有產業網路(Private Industrial Network, PIN)，在幾年前的教科書或所有的調查研究機構，都一致認爲公開式的電子市場，狹其參與者人數眾多所形成的網路效應，必定會主宰整個 B2B 的市場，然而事實的發展並非如此，幾個教科書上常描述的電子市場的明星包括：汽車業的 Convisint，跨產業的 Vertical Net，間接物料的 Commerce One Ariba 等電子市場網路紛紛關閉、合併或轉型成軟體供應商，而公開式的電子市場數，也由 2000 年的 1500 個泡沫至 2002 年的 750，2004 年以後更減少成小於 200 個，而供應鏈網路卻一路攀升，主導了整個 B2B，請問就你的判斷 電子市集的失敗有那些最重要的關鍵原因?(25%)

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科目：統計學【資管系碩士班甲組】

（一）、選擇題 （每小題5分）

1. A major videocassette rental chain is considering opening a new store in an area that currently does not have any such stores. The chain will open if there is evidence that more than 2,000 of the 10,000 households in the area are equipped with videocassette recorders (VCRs). The marketing manager will conduct a telephone poll of 400 randomly selected households in the area. Using a 5% level of significance, the error range is

   (a) 10%　　(b) 4.9%　　(c) 3.9%　　(d) 2.9%　　(e) 2%

2. Following question 1, the marketing manager conducts a telephone poll of 400 randomly selected households in the area and finds that 92 have VCRs. The rental chain's conclusion from the hypothesis test using a 5% level of significance is:

   （a） to open a new store.
   （b） not to open a new store.
   （c） to delay opening a new store until additional evidence is collected.
   （d） we cannot tell what the decision should be from the information given.
   （e） None of the above.

3. A hotel chain has identically sized resorts in 5 locations. The data that follow resulted from analyzing the hotel occupancies on randomly selected days in the 5 locations.

Row	Taipei	Kaohsiung	Taichung	Kending	A Li San
1	51	38	35	25	15
2	48	42	22	30	11
3	44	36	26	29	19
4	52	40	28	35	21
5	40	44	19	40	13
6	44	35	24	38	17

Which of the following statements is correct?

(a) The null hypothesis is there is no occupancy difference among the 5 locations. The analysis of variance is as the following table. The conclusion is to reject the null hypothesis.

Source	*SS*	*df*	*MS*	*F*	*p*
Location	3350.467	4	837.6167	37.49403	3.2E-10
Error	558.5	25	22.34		
Total	3908.967	29			

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科目：統計學【資管系碩士班甲組】

(b) The null hypothesis is there is no occupancy difference among the 5 locations. The analysis of variance is as the following table. The conclusion is not to reject the null hypothesis.

Source	*SS*	*df*	*MS*	*F*	*p*
Location	75.36667	5	15.07333	0.094366	0.992279
Error	3833.6	24	159.7333		
Total	3908.967	29			

(c) The null hypothesis is there is no occupancy difference among the 5 locations. The analysis of variance is as the following table. The conclusion is to reject the null hypothesis.

Source	*SS*	*df*	*MS*	*F*	*p*
Row	75.36667	5	15.07333	0.623982	0.683317
Locations	3350.467	4	837.6167	34.67435	9.84E-09
Error	483.1333	20	24.15667		
Total	3908.967	29			

(d) The null hypothesis is there is no occupancy difference among the 5 locations. The analysis of variance is as the following table. The conclusion is not to reject the null hypothesis.

Source	*SS*	*df*	*MS*	*F*	*p*
Row	75.36667	5	15.07333	0.623982	0.683317
Locations	3350.467	4	837.6167	34.67435	9.84E-09
Error	483.1333	20	24.15667		
Total	3908.967	29			

(e) The null hypothesis is there is no occupancy difference among the 5 locations. Because the means of five locations shown in the following table are different, the conclusion is to reject the null hypothesis.

	Taipei	Kaohsiung	Taichung	Kending	A Li San
Mean	46.5	39.167	25.667	32.833	16

4. The professor wanted to find out the average amount of time per week her students spend studying for the class. Among the 82 students in her class, 30% were freshmen, 45% were sophomores and 25% were juniors. She decided to draw 6 students randomly from the freshmen, 9 randomly from the sophomores and 5 randomly from the juniors. This is an example of

(a) a systematic sample.
(b) a complete random sample.
(c) a stratified sample.
(d) a snowball sample.
(e) a convenience sample.

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科目：統計學【資管系碩士班甲組】

5. Suppose a 95% confidence interval for μ turns out to be (56.7, 86.2). To make more useful inferences from the data, it is desired to reduce the width of the confidence interval. Which of the following will result in a reduced interval width?
   (a) Enlarge the sample frame.
   (b) Adopt the completely random sampling method.
   (c) Decrease the type II error and increase the type I error.
   (d) Increase the confidence level and enlarge the sample size.
   (e) Decrease the confidence level and increase the sample size.

6. Six experts rated two brands of Wulong tea in a taste-testing experiment. A rating on a 7-point scale (1=extremely unpleasing, 7=extremely pleasing) is given for each of four characteristics: taste, aroma, richness, and acidity. The following data displays the summated ratings – accumulated over all four characteristics. It is believed that the ratings follow normal distribution. To test whether two brands have different tastes, which of the following is correct?

Expert	Brand A	Brand B	Difference
1	27	25	2
2	18	24	-6
3	23	29	-6
4	24	26	-2
5	28	25	3
6	24	29	-5
Mean	24	26.333	-2.333
Standard deviation	3.521	2.160	4.033
Standard error	1.438	0.882	1.647
	Pooled variance = 8.5333		

(a) $\begin{cases} H_0 : \mu_A = \mu_B \\ H_1 : \mu_A \neq \mu_B \end{cases}$ H_0 is rejected. (b) $\begin{cases} H_0 : \mu_A = \mu_B \\ H_1 : \mu_A \neq \mu_B \end{cases}$ H_0 can not be rejected.

(c) $\begin{cases} H_0 : \mu_D = 0 \\ H_1 : \mu_D \neq 0 \end{cases}$ H_0 is rejected. (d) $\begin{cases} H_0 : \mu_D = 0 \\ H_1 : \mu_D \neq 0 \end{cases}$ H_0 can not be rejected.

(e) The information is insufficient to decide.

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科目：統計學【資管系碩士班甲組】

（二） 填充題 （每小題 4 分）

A consumer products company wants to measure the effectiveness of different types of advertising media in the promotion of its products. Specifically, the company is interested in the effectiveness of Internet advertising and newspaper advertising (including the cost discount coupons). A sample of 18 cities with approximately equal populations is selected for study during a test period of one month. Each city is allocated a specific expenditure level both for Internet advertising and for newspaper advertising. The sales of the product (in thousands of NT dollars) and also the levels of media expenditure (in thousands of NT dollars) during the test month are recorded. The Microsoft Excel Output 1 shows results of this multiple regression:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon, \text{ where}$$

Y: sales, X_1: Internet advertising expenditure, and X_2: newspaper advertising expenditure.

Output 1

摘要輸出

迴歸統計	
R 的倍數	0.89180974
R 平方	0.79532462
調整的 R 平方	0.76803457
標準誤	176.353804
觀察值個數	18

ANOVA

	自由度	SS	MS	F	顯著值
迴歸	2	1812757.65	906378.8	29.14339	6.8076E-06
殘差	15	466509.9615	31100.66		
總和	17	2279267.611			

	係數	標準誤	t 統計	P-值
截距	306.166667	133.897664	2.286572	0.037176
Internet	11.7871795	2.048574293	5.753845	3.81E-05
Newspaper	14.5589744	3.460175504	4.207583	0.000761

1. According to Output 1, what fraction of the variability in sales is explained by spending on media advertising? 填充題（1）

2. Referring to Output 1, which of the independent variables in the model are significant at the 5% level? 填充題（2）

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3. Referring to Output 1, a city had sales of 1177 thousand NT dollars with advertising spending of 35 thousand NT dollars on Internet and 35 thousand dollars on newspaper. What is the residual (in thousand NT dollars) for this data point? 填充題（3）

4. Now the Internet advertising and newspaper may have interaction effects. Write a regression model that includes this interaction effect. 填充題（4）

5. Output 2 displays the regression statistics that includes the interaction effect. Which regression model is more appropriate, the one used for Output 1 or the one used for Output 2? _____ 填充題（5）

Output 2

摘要輸出

迴歸統計	
R 的倍數	0.89542597
R 平方	0.80178767
調整的 R 平方	0.75931361
標準誤	179.638314
觀察值個數	18

ANOVA

	自由度	SS	MS	F	顯著值
迴歸	3	1827488.678	609162.893	18.87711	3.4335E-05
殘差	14	451778.9328	32269.9238		
總和	17	2279267.611			

	係數	標準誤	t 統計	P-值
截距	736.470092	651.3202427	1.13073423	0.277166
Internet	2.97103635	13.21431643	0.22483466	0.825356
Newspaper	-0.1030655	21.98522259	-0.00468794	0.996326
Interaction	0.29309872	0.433806791	0.67564345	0.510274

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科目：統計學【資管系碩士班甲組】

(三)、 計算題

1. Suppose that we would like to calculate the probability of the 3rd spade appeared on the 6th draw from a deck of cards randomly by using the multiplication rule of conditional probabilities. Below discusses one of the ways to calculate the probability.
   (a) Let event A be "a spade shown on the 6th draw." Find the probability of A. (5 分)
   (b) Let event B be "two spades shown in the first five draws." Find the probability of B given A. (5 分)
   (c) Find the desired probability. (5 分)

2. A **cumulative probability function** F(x) of a continuous random variable X is defined as follows.

$$F(x)=\begin{cases} ae^{x} & ,x\le 0 \\ a(2-e^{-x}) & ,x\ge 0 \end{cases} \qquad a \text{ is a constant}$$

   (a) What is the value of a? (3 分)
   (b) What is the 75th percentile of this distribution? (3 分)
   (c) Graph the probability density function f(x). (3 分)
   (d) Argue that E(X) = 0. (3 分)

3. The joint probability distribution of the price received (P) and the quantity sold (Q) of a product is as follows:

	Q		
P	30	40	50
6	0.2	0.3	0.1
8	0.2	0.1	0.1

   (a) Find E(P) and E(Q). (3 分)
   (b) The revenue from the sale is R = PQ. Find E(R). (3 分)
   (c) Calculate the covariance of P and Q. What does it indicate? (5 分)

4. A financial analyst is presented with information on the past records of 60 start-up companies and told that in fact only five of them have managed to become successful. He selected three companies out of the 60 companies as the candidates for success. The financial analyst's choice constitutes a random experiment.
   (a) How many elements in the outcome space for this experiment? (3 分)
   (b) A random variable X is defined to be the number of companies the analyst selected that would eventually become successful. If the analyst chooses the companies randomly, what probability distribution best describes X? (3 分)
   (c) Instead of randomness, suppose that the probability of the analyst's spotting a successful company is three times as much as that of spotting an unsuccessful one. Find the probability of a "single outcome" event in the outcome space that corresponds to X=1. (6 分)

(A) 共 5 題複選題，每題 5 分

1.系統架構 (System Architecture) 裡最重要的 2 個觀點是：
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- D. not (P or Q) or (not P and Q)
- E. (P or (Q or R)) implies ((P or Q) and (P or R))
- F. P or (P and Q)

3. 非程序 (Non-Procedural) 類的程式語言包括：
- A. Pascal
- B. Prolog
- C. LISP
- D. Basic
- E. COBOL
- F. Fortran

4. 下列何者相當於類別庫 (Package)：
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- E. 名稱空間 (Name Space)
- F. 副程式 (Subprogram)

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(B) 共 6 題單選題，每題 5 分

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    int y;};
   Employee:: Employee (int b, int c) : Person (b) {y = c;}
main(){
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上列 C++ 程式執行結束後 e1.x 和 e1.y 的值是什麼？

A. 20 和 20
B. 20 和 30
C. 20 和 40
D. 30 和 20
E. 30 和 30
F. 40 和 40

7. 軟體黑箱測試 (Black-Box Testing) 不包括：

A. 等價分割法
B. 背對背測試法
C. 邊界值分析法
D. 分枝涵蓋法
E. 因果圖解法
F. 比較測試法

8. 在 Web 程式設計裡，一個 Web Service 裡會擁有很多個：

A. 類別 (Class)
B. 服務 (Service)
C. 操作 (Operation)
D. 結合 (Association)
E. 連結 (Connection)
F. 物件 (Object)

9. 下列 Visual Basic 語言片段程式的執行結果爲何?

```
X = 0
For N = 1 to 50
  If  N Mod 15 = 0 Then
      X = X + 1
  End if
Next N
Print "X="; X
```

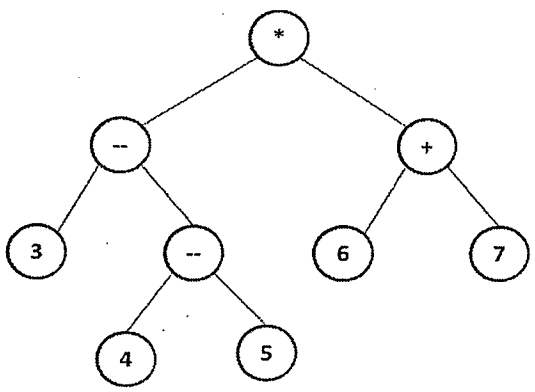
A. X = 5　B. X = 15　C. X = 3　D. X = 50

10. 下列 C 語言片段程式的執行結果爲何?

```
#include<stdio.h>
main()
{ int x1=69, x2=5;
 While(x1) {x1/=x2++;}
 Printf("%d\n", x2)};
}
```

A. x2 = 9　B. x2 = 7　C. x2 = 6　D. x2 = 8

11. 下面這個兩元樹 (Binary Tree) 所代表的算術運算式爲何?



A. 3-4-5*6+7　B. (3-(4-5))*(6+7)　C. (3-4-5)*(6+7)　D. 3-(4-5)*(6+7)

(C) 共 3 題填空題，每題 5 分

12. 整理資料 (Data) 的工具稱作資料庫 (Database) ，整理軟體 (Software) 的工具稱作_____。

13.
```
#include <iostream.h>
class Time{
  public:
    Time (int = 11, int =22, int = 33);
    int hour;
    int minute;
    int second;};
 Time:: Time (int hr, int min, int sec)
  {  hour = hr;
     minute = min;
     second = sec;}
main(){
  Time t1 (8);
  cout << t1.hour << ' ' << t1.minute << ' ' << t1.second << endl;}
```
上列 C++程式執行結束後，會列印出：_____。

14. 作業系統 (Operating System) 的架構框架 (Architecture Framework)，約略分成四個層級 (Layer)。最下層稱之爲處理管理層級 (Process Management Layer)，上一層稱之爲_____，再上一層稱之爲伺服器處理層級 (Server Processes Layer)，最上層稱之爲使用者處理層級 (User Processes Layer)。

(D) 共 5 題問答題，共 30 分

15. (5 分) 請解釋 Cloud computing 的意涵與特性。
16. (5 分) 請說明網路服務 Podcast 的主要運作方式及應用。
17. (5 分) 請解釋資訊軟體界的最新發展趨勢 SaaS 的全名與意涵。
18. (5 分) 請解釋 **solid-state drive (SSD)** 意涵與特性。
19. (10 分) 在一個電腦系統中有四個型態相同的資源 (resources) 由三個電腦程序 (Processes) 所共享, 每一個電腦程序最多只需要兩個資源來完成工作. 請證明這是一個 deadlock free 的系統.

國立中山大學99學年度碩士班招生考試試題

科目：資料結構【資管系碩士班乙組】

1. (15%) Let A and B be two lower triangular matrices, each with n rows and n columns. The total number of elements in the two matrices is thus $n(n+1)$. Write a procedure to create a two-dimensional array C[n, n+1] such that nonzero terms in A and B can be stored in C, with the constraint C[i, j] = A[i, j], $1 \leqq i, j \leqq n$ for those nonzero terms in A.

2. (15%) Write a procedure SWAPTREE(T) which takes a binary tree T and swaps the left and right children of every node in T.

3. (20%) Consider a graph G = (V, E), where V={1, 2, 3, 4, 5, 6}, E={(1, 2), (2, 3), (3, 4), (4, 5), (1, 5), (2, 4), (2, 6), (1, 6), (4, 6), (5, 6)}, and the costs for edges (1, 2),
(2, 3), (3, 4), (4, 5), (1, 5), (2, 4), (2, 6), (1, 6), (4, 6), and (5, 6) are 16, 5, 10, 18, 19, 6, 11, 21, 14, and 33 respectively.
   (A) Use adjacency list to represent the graph G. (5%)
   (B) Use breadth-first search to create a spanning tree (starting from vertex 1) (5%)
   (C) Use Prim's algorithm to find the minimum cost spanning tree. (10%)

4. (15%) Consider the following pseudo code for sorting a set of numbers located between the p'th element and the r'th element of array A.

```
MERGE-SORT(A, p, r)
If p<r
  Then q←⌊(p+r)/2⌋
       MERGE-SORT(A, p, q)
       MERGE-SORT(A, q+1, r)
       MERGE(A, p, q, r)
```

   (A) List the recurrence function for the complexity of MERGE-SORT(A, 1, n) (10%)
   (B) Compute the complexity of MERGE-SORT(A, 1, n) using O-notation (5%)

5. (10%) We say a finite set is countable if it can be put into a one-to-one correspondence with N (i.e., the set of non-negative integers). Show that the set of odd numbers, as shown below, is countable.

   ... -7, -5, -3, -1, 1, 3, 5, 7, ...

國立中山大學99學年度碩士班招生考試試題

科目：資料結構【資管系碩士班乙組】

6. (10%) Show the number of edges of the following undirected graphs:
   (A) a complete graph with n vertices (5%)
   (B) a connected and acyclic graph with n vertices (5%)

7. (15%) Consider b identical bins.
   (A) Suppose you toss n balls. How many balls fall in a given bin in average? (5%)
   (B) How many balls should you toss in average until every bin contains at least one ball? (10%)