國立雲林科技大學
八十九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

壹、是非題(50%)(請寫上題號，並回答「○」或「×」；答錯倒扣 1 分)(每題2分)

1. 只要母體比樣本大很多，則隨機樣本的統計量之精確性與母體大小無關。

2. 在相同的樣本大小之下，母體的比例 p 愈接近 0.5，則抽樣的誤差界限(margin of error)愈大。

3. 在一個右偏的資料分配中，其平均數大於中位數與眾數。

4. 將一組資料的各個觀測值皆乘以一常數 k，則平均數與標準差皆變為原來的 k 倍。

5. 已知 A 與 B 為獨立事件，且 P(A)=0.3，P(B)=0.5，則 $P(\bar{A}\cap\bar{B})=0.35$

6. 若 $P(A\cap B)<P(A)\cdot P(B)$，則 $P(A)<P(A/B)$。

7. 設有一堆彩券，其中 m 張有獎，n 張無獎；若採不放回抽樣，則先抽與後抽之中獎機率不同。

8. 當 E(XY)=E(X)E(Y)時，則隨機變數 X 與 Y 未必獨立。

9. 設箱子中有 m 個白球與 n 個黑球(m,n 皆大於 3)，茲從箱子抽出 3 個球；採放回抽樣，令 X 表示白球個數；另採不放回抽樣，令 Y 表示白球個數，則 Var(X)<Var(Y)。

10. 設 X 與 Y 皆為二項分配，且互為獨立；已知 X~b(m,0.3)，Y~b(n,0.4)，則 X+Y 亦為二項分配。

11. 已知 X 與 Y 皆為卡方分配，且互為獨立，其自由度分別為 m 與 n，則 X+Y 亦為卡方分配，且自由度為 m+n-2。

12. 設 $\hat{\theta}$ 為 θ 的估計量，已知 $MSE(\hat{\theta})=10$，$E(\hat{\theta})-\theta=1$，則 $Sd(\hat{\theta})=3$。
註：MSE 為 Mean Square Error 的縮寫；Sd 表示標準差。

13. 設 X 的抽樣分配為 t 分配，則每次抽樣所獲得的信賴區間(同為 95%的信賴水準)之長度皆相同。

14. 在其他條件不變下，母體平均數之信賴區間長度會隨著樣本數增加而變長。

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15.設有一檢定問題，母體參數為 θ，檢定統計量為 $\hat{\theta}$；其拒絕域為 $\hat{\theta}>a$；若將拒絕域改為 $\hat{\theta}>b$，其中 $a>b$，則型 I 誤差變大，型 II 誤差變小。

16.在同一個檢定問題中，若樣本數增加而其他條件不變下，則型 I 誤差變小但型 II 誤差變大。

17.在母體平均數的檢定中，檢定統計量 X 的值愈大，則愈顯著，且 P-value 愈小。

18.設有二種實驗設計，其一為兩個獨立樣本的設計($n1=n2=n$)，另一為成對樣本的設計(n 對)，若要求相同的估計標準誤，則成對樣本設計之 t-檢定，其檢定力較小。

19.在二項式母體比例的檢定中 $H_0: P_1=P_0$；$P_2: 1-P_0$；可同時用卡方檢定與標準常態檢定，且卡方值等於標準常態值的平方。

20.在一因子的變異數分析(ANOVA)中，殘差(residual)的變異數愈大，則此檢定愈顯著。

21.在具有交互作用的二因子變異數分析中，若交互作用效果顯著，則此時檢定主效果的顯著與否並無意義。

22.在一複迴歸分析中，判定係數愈大則迴歸模型的 F 檢定統計量之值愈大。

23.在一複迴歸分析中，設有二個自變數 X1 與 X2，若 X1 的 t-比值(t-ratio)愈大，則表示 X1 之迴歸係數的顯著性愈大。

24.設有兩組樣本分別進行迴歸分析與相關分析，則各別求出的判定係數等於相關係數。

25.在相同條件下，採用有母數統計方法比無母數統計方法要來得有效。

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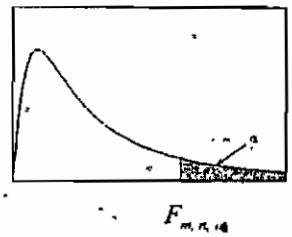
系所：企管系、資管所

科目：統計學

F分配表

$\alpha=0.05$

$$P(F_{m,n} \geq F_{m,n,\alpha}) = \alpha$$



分母自由度n \ 分子自由度m	1	2	3	4	5	6	7	8	9
1	161.448	199.500	215.707	224.583	230.162	233.986	236.768	238.883	240.543
2	18.5128	19.0000	19.1643	19.2468	19.2964	19.3295	19.3532	19.3710	19.3848
3	10.1280	9.5521	9.2766	9.1172	9.0135	8.9406	8.8867	8.8452	8.8123
4	7.7086	6.9443	6.5914	6.3882	6.2561	6.1631	6.0942	6.0410	5.9988
5	6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725
6	5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2067	4.1468	4.0990
7	5.5914	4.7374	4.3468	4.1203	3.9715	3.8660	3.7870	3.7257	3.6767
8	5.3177	4.4590	4.0662	3.8379	3.6875	3.5806	3.5005	3.4381	3.3881
9	5.1174	4.2565	3.8625	3.6331	3.4817	3.3738	3.2927	3.2296	3.1789
10	4.9646	4.1028	3.7083	3.4780	3.3258	3.2172	3.1355	3.0717	3.0204
11	4.8443	3.9823	3.5874	3.3567	3.2039	3.0946	3.0123	2.9480	2.8962
12	4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7964
13	4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7144
14	4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458
15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408	2.5876
16	4.4940	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911	2.5377
17	4.4513	3.5915	3.1968	2.9647	2.8100	2.6987	2.6143	2.5480	2.4943
18	4.4139	3.5546	3.1599	2.9277	2.7729	2.6613	2.5767	2.5102	2.4563
19	4.3807	3.5219	3.1274	2.8951	2.7401	2.6283	2.5435	2.4768	2.4227
20	4.3512	3.4928	3.0984	2.8661	2.7109	2.5990	2.5140	2.4471	2.3928
21	4.3248	3.4668	3.0725	2.8401	2.6848	2.5727	2.4876	2.4205	2.3660
22	4.3009	3.4434	3.0491	2.8167	2.6613	2.5491	2.4638	2.3965	2.3419
23	4.2793	3.4221	3.0280	2.7955	2.6400	2.5277	2.4422	2.3748	2.3201
24	4.2597	3.4028	3.0088	2.7763	2.6207	2.5082	2.4226	2.3551	2.3002
25	4.2417	3.3852	2.9912	2.7587	2.6030	2.4904	2.4047	2.3371	2.2821
26	4.2252	3.3690	2.9752	2.7426	2.5868	2.4741	2.3883	2.3205	2.2655
27	4.2100	3.3541	2.9604	2.7278	2.5719	2.4591	2.3732	2.3053	2.2501
28	4.1960	3.3404	2.9467	2.7141	2.5581	2.4453	2.3593	2.2913	2.2360
29	4.1830	3.3277	2.9340	2.7014	2.5454	2.4324	2.3463	2.2783	2.2229
30	4.1709	3.3158	2.9223	2.6896	2.5336	2.4205	2.3343	2.2662	2.2107
35	4.1213	3.2674	2.8742	2.6415	2.4851	2.3718	2.2852	2.2167	2.1608
40	4.0847	3.2317	2.8387	2.6060	2.4495	2.3359	2.2490	2.1802	2.1240
45	4.0566	3.2043	2.8115	2.5787	2.4221	2.3083	2.2212	2.1521	2.0958
50	4.0343	3.1826	2.7900	2.5572	2.4004	2.2864	2.1992	2.1299	2.0734
60	4.0012	3.1504	2.7581	2.5252	2.3683	2.2541	2.1665	2.0970	2.0401
70	3.9778	3.1277	2.7355	2.5027	2.3456	2.2312	2.1435	2.0737	2.0166
80	3.9604	3.1108	2.7188	2.4859	2.3287	2.2142	2.1263	2.0564	1.9991
90	3.9469	3.0977	2.7058	2.4729	2.3157	2.2011	2.1131	2.0430	1.9856
100	3.9361	3.0873	2.6955	2.4626	2.3053	2.1906	2.1025	2.0323	1.9748
120	3.9201	3.0718	2.6802	2.4472	2.2899	2.1750	2.0868	2.0164	1.9588

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t分配表

$$P(t_k \geq t_{k,\alpha}) = \alpha$$

$t_{k,\alpha}$

自由度	單尾顯著水準						
	0.1	0.05	0.025	0.01	0.005	0.0025	0.001
1	3.0777	6.3138	12.7062	31.8205	63.6567	127.3213	318.3088
2	1.8856	2.9200	4.3027	6.9646	9.9248	14.0890	22.3271
3	1.6377	2.3534	3.1824	4.5407	5.8409	7.4533	10.2145
4	1.5332	2.1318	2.7764	3.7469	4.6041	5.5976	7.1732
5	1.4759	2.0150	2.5706	3.3649	4.0321	4.7733	5.8934
6	1.4398	1.9432	2.4469	3.1427	3.7074	4.3168	5.2076
7	1.4149	1.8946	2.3646	2.9980	3.4995	4.0293	4.7853
8	1.3968	1.8595	2.3060	2.8965	3.3554	3.8325	4.5008
9	1.3830	1.8331	2.2622	2.8214	3.2498	3.6897	4.2968
10	1.3722	1.8125	2.2281	2.7638	3.1693	3.5814	4.1437
11	1.3634	1.7959	2.2010	2.7181	3.1058	3.4966	4.0247
12	1.3562	1.7823	2.1788	2.6810	3.0545	3.4284	3.9296
13	1.3502	1.7709	2.1604	2.6503	3.0123	3.3725	3.8520
14	1.3450	1.7613	2.1448	2.6245	2.9768	3.3257	3.7874
15	1.3406	1.7531	2.1314	2.6025	2.9467	3.2860	3.7328
16	1.3368	1.7459	2.1199	2.5835	2.9208	3.2520	3.6862
17	1.3334	1.7396	2.1098	2.5669	2.8982	3.2224	3.6458
18	1.3304	1.7341	2.1009	2.5524	2.8784	3.1966	3.6105
19	1.3277	1.7291	2.0930	2.5395	2.8609	3.1737	3.5794
20	1.3253	1.7247	2.0860	2.5280	2.8453	3.1534	3.5518
21	1.3232	1.7207	2.0796	2.5176	2.8314	3.1352	3.5272
22	1.3212	1.7171	2.0739	2.5003	2.8188	3.1180	3.5050
23	1.3195	1.7139	2.0687	2.4999	2.8073	3.1040	3.4850
24	1.3178	1.7109	2.0639	2.4922	2.7969	3.0905	3.4668
25	1.3163	1.7081	2.0595	2.4851	2.7874	3.0782	3.4502
26	1.3150	1.7056	2.0555	2.4706	2.7787	3.0669	3.4350
27	1.3137	1.7033	2.0518	2.4727	2.7707	3.0565	3.4210
28	1.3125	1.7011	2.0484	2.4671	2.7633	3.0469	3.4082
29	1.3114	1.6991	2.0452	2.4620	2.7564	3.0380	3.3962
30	1.3104	1.6973	2.0423	2.4573	2.7500	3.0298	3.3852
35	1.3062	1.6896	2.0301	2.4377	2.7238	2.9960	3.3400
40	1.3031	1.6839	2.0211	2.4233	2.7045	2.9712	3.3069
45	1.3006	1.6794	2.0141	2.4121	2.6896	2.9521	3.2815
50	1.2987	1.6759	2.0086	2.4033	2.6778	2.9370	3.2614
60	1.2958	1.6706	2.0003	2.3901	2.6603	2.9146	3.2317
70	1.2938	1.6669	1.9944	2.3808	2.6479	2.8987	3.2108
80	1.2922	1.6641	1.9901	2.3739	2.6387	2.8870	3.1953
90	1.2910	1.6620	1.9867	2.3685	2.6316	2.8779	3.1833
100	1.2901	1.6602	1.9840	2.3642	2.6259	2.8707	3.1737
200	1.2858	1.6525	1.9719	2.3451	2.6006	2.8385	3.1315
300	1.2844	1.6499	1.9679	2.3388	2.5923	2.8279	3.1176
400	1.2837	1.6487	1.9659	2.3357	2.5882	2.8227	3.1107
500	1.2832	1.6479	1.9647	2.3338	2.5857	2.8195	3.1066
600	1.2830	1.6474	1.9639	2.3326	2.5840	2.8175	3.1039
700	1.2828	1.6470	1.9634	2.3317	2.5829	2.8160	3.1019
800	1.2826	1.6468	1.9629	2.3310	2.5820	2.8148	3.1005
900	1.2825	1.6465	1.9626	2.3305	2.5813	2.8140	3.0993
1000	1.2824	1.6464	1.9623	2.3301	2.5808	2.8133	3.0984

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系所：資管系
科目：資訊管理導論

(I) Short Answer (5 % each)

1、What are the different ways to control access to data, computers, and networks?
2、Compare and contrast the waterfall and spiral approaches to the implementation of the SDLC.
3、Distinguish between business processes that cross functional areas of business and those that are specific to functional areas.
4、What role does OLAP play in a DSS?
5、What AI-related techniques other than expert systems and neural networks are beginning to attain prominence?
6、What is de-skilling? Explain whether information systems necessarily lead to de-skilling of their users?
7、Explain the relationship between competitive advantage and competitive necessity?
8、What technology trends have enabled IT-based innovation in business?
9、What new organizational structures exist in organizations?
10、What are the major advantages and disadvantages of integrated ERP software as compared to best-of-breed vertical software?

(II)Please compare and contrast neural computing and conventional computing?[25%]

(III)Please (1)define Internet Community? [5%] (2) list its main four types?[10%] (3) by what ways it can create value?[10%]

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八十九學年度研究所碩士班入學考試試題 科目：計算機概論 (甲)

10. What does the following C program print?

```
#include <stdio.h>

#define LOW 0
#define HIGH 5
#define CHANGE 2
void workover(int);
int reset(int);

int i = LOW;

void main()
{
    auto int i = HIGH;
    reset(i/2);
    reset(i=i/2);
    i = reset(i/2);
    workover(i);
    printf("%d\n", i);
}

void workover(int i)
{
    i = (i % i) * ((i * i) / (2 * i) + 4);
}

int reset(int i)
{
    i = i <= CHANGE ? HIGH : LOW;
    return(i);
}
```

(A) 5 (B) 6 (C) 7 (D) 8 (E) 9

11. What does the following C program print?

```
#include <stdio.h>

int a[] = {0, 1, 2, 3, 4};
int *p[] = {a, a+1, a+2, a+3, a+4};
int **pp = p;

void main()
{
    **pp++;
    printf("%d\n", **pp);
}
```

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

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12. What does the following C program print?

```
#include <stdio.h>

char *c[] = {
    "ENTER",
    "NEW",
    "POINT",
    "FIRST"
};
char **cp[] = {c+3, c+2, c+1, c};
char ***cpp = cp;

void main()
{
    **++cpp;
    printf("%s\n", *--*++cpp+3);
}
```

(A) ER (B) NT (C) ST (D) NEW (E) FIRST

13. What does the following C program print?

```
#include <stdio.h>

void main()
{
    static struct S1 {
        char c[4], *s;
    } s1 = {"abc", "def"};
    static struct S2 {
        char *cp;
        struct S1 ss1;
    } s2 = {"ghi", {"jkl", "mno"}};

    printf("%s\n", ++s2.ss1.s);
}
```

(A) ghl (B) jkl (C) mno (D) kl (E) no

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14. What does the following C program print?

```
#include <stdio.h>

struct S1 {
    char *s;
    int i;
    struct S1 *s1p;
};

void main()
{
    static struct S1 a[] = {
        {"abcd", 1, a+1},
        {"efgh", 2, a+2},
        {"ijkl", 3, a}
    };
    struct S1 *p = a;

    printf("%s\n", a[--(p->s1p->i)].s);
}
```

(A) abcd (B) efgh (C) ijkl (D) cd (E) gh

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15. What does the following C program print?

```
#include <stdio.h>

struct S1 {
    char *s;
    struct S1 *s1p;
};
void swap(struct S1 *, struct S1 *);

void main()
{
    static struct S1 a[] = {
        {"abcd", a+1},
        {"efgh", a+2},
        {"ijkl", a}
    };
    struct S1 *p[3];
    int i;

    for (i = 0; i < 3; i++)
        p[i] = a[i].s1p;
    swap(*p, a);
    printf("%s\n", (*p)->s1p->s);
}

void swap(struct S1 *p1, struct S1 *p2)
{
    struct S1 temp;

    temp.s = p1->s;
    p1->s = p2->s;
    p2->s = temp.s;
}
```

(A) abcd (B) efgh (C) ijkl (D) fgh (E) jkl

16. How many Class C networks can there be?
(A) 2^{16} (B) 2^{18} (C) 2^{21} (D) 2^{24} (E) 2^{27}

17. Suppose we digitize voice at 8000 samples/s, where each sample is 1 byte. How long will it take to fill an ATM cell?
(A) 6ms (B) 12ms (C) 18ms (D) 24ms (E) 30ms

國立雲林科技大學
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18. A voice channel takes 30KHz, including a guard band that provides protection against small drifts in transmission frequency. If we divide the listening area into square cells, so that no two adjacent cells that share a side use the same frequency band, how many simultaneous calls can the 25-MHz spectrum support in a city with 250 cells?
(A) 8,000 (B) 15,715 (C) 26,875 (D) 33,215 (E) 41,500

19. What is the peak throughput achievable by a source employing stop-and-wait flow control when the maximum packet size is 1000 bytes, and the network spans 10KM?
(A) 22.07Mbps (B) 35.08Mbps (C) 47.96Mbps
(D) 63.27Mbps (E) 84.03Mbps

20. Let T(A,B,C,D,E,F) be a relation schema with associated set F = {A → B, C → DF, AC → E, D → F} of functional dependencies. What is highest normal form that relation T is in?
(A) 1NF (B) 2NF (C) 3NF (D) BCNF (E) 4NF

21. Let R = {(1, 2), (2, 2), (2, 3)} be a relation on the set {1, 2, 3}. What is R^+, the transitive closure of R?
(A) {(1, 2), (2, 2), (2, 3), (1, 1)} (B) {(1, 2), (2, 2), (2, 3), (3, 2)}
(C) {(1, 2), (2, 2), (2, 3), (1, 3)} (D) {(1, 2), (2, 2), (2, 3), (3, 1), (3, 3)}
(E) {(1, 2), (2, 2), (2, 3), (1, 3), (2, 1)}

22. Which of the following properties does the relation < on the set of integer have?
I. Reflexive II. Transitive III. Symmetric IV. Asymmetric
(A) None (B) I and II only (C) II and IV only
(D) I, III, and IV (E) II, III, and IV

23. A regular expression that denotes all strings of 0's and 1's that have at least two consecutive 0's is
(A) (1+01)*00(01+1)* (B) (0+1)*00(0+1)* (C) (0+1)*01*0(0+1)*
(D) 1*00(1+01)*(0+1)* (E) (1+00)*

24. S → A0B
A → BB|0
B → AA|1
What is the number of terminal strings of length 5 generated by the context-free grammar shown above?
(A) 4 (B) 5 (C) 6 (D) 7 (E) 8

25. Consider a program with five virtual pages, numbered from 0 to 4. The program pages are referenced in the order
0 1 2 3 0 1 4 0 1 2 3 4?
If there are four page frames in the memory and all page frames are initially empty, how many page faults will occur?
(A) 8 (B) 9 (C) 10 (D) 11 (E) 12

26. The computers and networks that form the basis for the emerging information economy are known as the
(A) information infrastructure.
(B) broadband network.
(C) Internet.
(D) World Wide Web
(E) Ethernet.

27. Using technology to extend the educational process beyond the walls of the school is known as
(A) expanded learning.
(B) telecommuting.
(C) distance learning.
(D) local area networking.
(E) wide area networking.

28. Any computer program can be constructed from these three control structures.
(A) looping, sequence, and default
(B) sequence, selection, and repetition
(C) debugging, stepwise refinement, and top-down
(D) pseudocode, refinement, and default
(E) decision, syntax, and selection

29. A program that is a collection of data and instructions, and that can send and receive messages is
(A) visual programming.
(B) high-level programming.
(C) low-level programming.
(D) macro programming.
(E) object-oriented programming.

30. Which of the following is a tool that allows analysts and programmers to automate many of the tedious and error-prone steps involved in turning design specifications into programs?
(A) a macro
(B) SQL
(C) CASE
(D) software engineering
(E) stepwise refinement

31. Which of the following has traditionally been conducted using EDI, enterprisewide messaging systems, fax communication, bar coding, and private LAN and WAN systems?
(A) Business alliance
(B) Business strategy
(C) E-commerce
(D) E-mail
(E) Transborder data flow

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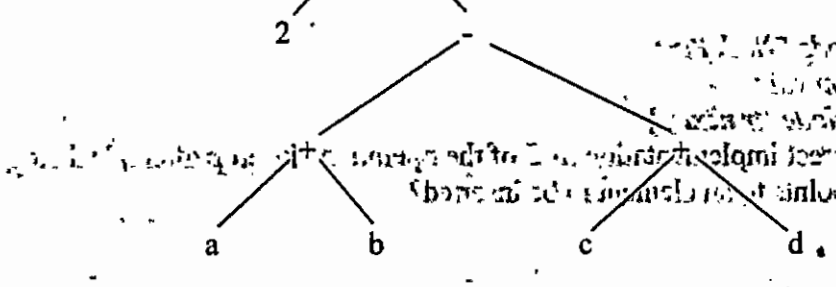
Multiple choice. Choose the one alternative that best completes the statement or answers the question.
（每題2分，答錯不倒扣）

1.



Which of the following arithmetic expressions corresponds directly to the parse tree given by the diagram in the figure above?

(A) 2(a - c)
(B) 2a – 2c
(C) 2(a + b) – c + d
(D) 2((a + b) – (c + d))
(E) 2(a + b) – 2(c + d)

2. Which of the following statements must be true?

I. $\lfloor x \rfloor = \lceil x \rceil$ if and only if x is an integer.
II. $\lfloor x \rfloor + 1 = \lceil x \rceil$ if and only if x is not an integer.
III. $\lfloor x \rfloor \lceil y \rceil = \lceil x \rceil \lfloor y \rfloor$ for all x, y.
IV. $-\lfloor x \rfloor = \lceil -x \rceil$ for all x.

(A) IV only (B) I and IV only (C) I, II, and III only
(D) I, II, and IV only (E) I, II, III, and IV

3. Consider a computer system in which processes can request and release one or more resources. Once a process has been granted a resource, the process has exclusive use of that resource until it is released. If a process requests a resource that is already in use, the process enters a queue for that resource, waiting until the resource is available. Which of the following will NOT deal effectively with the problem of deadlock?

(A) Giving priorities to processes and ordering the wait queues by priority
(B) Having a process request all its required resources when it first begins, and restarting if it cannot obtain them all
(C) Numbering the resources and requiring that processes request resources in order of increasing number
(D) Having processes time out and restart after a random interval of waiting
(E) Having the operating system monitor the wait queues and restart processes to break deadlocks

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4. In a language in which operations are associated right-to-left instead of left-to-right (i.e., a + b + c = a + (b + c)), the value of the expression 7 – (16 / (3 + 1) * 2) - 4 is
(A) -1 (B) 1 (C) 3 (D) 7 (E) 9

5. Assume that a list is constructed of elements with two fields, *val* and *next*, by using the *next* field of each element to point to the next element in the list. If elements of the list are characterized in C by

```
typedef struct node *NodePtr ;
struct node {   int val ;
                NodePtr next ; }
```

which of the following is a correct implementation in C of the operation "insert *p* after *q*" where *q* points to a list element and *p* points to an element to be inserted?

(A)
```
q->next = p->next ;
p->next = q ;
```
(B)
```
q->next = p->next ;
p->next = q->next ;
```
(C)
```
q->next = p ;
p->next = q->next ;
```
(D)
```
p->next = q->next ;
q->next = p ;
```
(E)
```
p->next = q;
q->next = p->next ;
```

6. What does the following C program print?

```
#include <stdio.h>

#define LOW 0
#define HIGH 5
#define CHANGE 2
int reset(int);

int i = LOW;

void main()
{
    auto int i = HIGH;
    reset(i/2);
    reset(i=i/2);
    i = reset(i/2);
    printf("%d\n", i);
}

int reset(int i)
{
    i = i <= CHANGE ? HIGH : LOW;
    return(i);
}
```

(A) 4 (B) 5 (C) 6 (D) 7 (E) 8

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7. What does the following C program print?

```
#include <stdio.h>

int a[] = {0, 1, 2, 3, 4};
int *p[] = {a, a+1, a+2, a+3, a+4};
int **pp = p;

void main()
{
    *++*pp;
    printf("%d\n", **pp);
}
```

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

8. What does the following C program print?

```
#include <stdio.h>

char *c[] = {
    "ENTER",
    "NEW",
    "POINT",
    "FIRST"
};
char **cp[] = {c+3, c+2, c+1, c};
char ***cpp = cp;

void main()
{
    printf("%s\n", **++cpp);
}
```

(A) ER (B) NT (C) ST (D) NEW (E) POINT

9. What does the following C program print?

```
#include <stdio.h>

void main()
{
    static struct S1 {
        char c[4], *s;
    } s1 = {"abc", "def"};
    static struct S2 {
        char *cp;
        struct S1 ss1;
    } s2 = {"ghi", {"jkl", "mno"}};

    printf("%s\n", ++s2.cp);
}
```

(A) ghl (B) jkl (C) mno (D) kl (E) hi

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10. What does the following C program print?

```
#include <stdio.h>

struct S1 {
    char *s;
    int i;
    struct S1 *s1p;
};

void main()
{
    static struct S1 a[] = {
        {"abcd", 1, a+1},
        {"efgh", 2, a+2},
        {"ijkl", 3, a}
    };
    struct S1 *p = a;

    printf("%s\n", a[(++p)->i].s);
}
```

(A) abcd (B) efgh (C) ijkl (D) cd (E) gh

11. What does the following C program print?

```
#include <stdio.h>

struct S1 {
    char *s;
    struct S1 *s1p;
};
void swap(struct S1 *, struct S1 *);

void main()
{
    static struct S1 a[] = {
        {"abcd", a+1},
        {"efgh", a+2},
        {"ijkl", a}
    };
    struct S1 *p[3];
    int i;

    for (i= 0; i<3; i++)
        p[i] = a[i].s1p;
    swap(*p,a);
    printf("%s\n", (*p)->s);
}

void swap(struct S1 *p1, struct S1*p2)
{
    struct S1 temp;

    temp.s = p1->s;
    p1->s = p2->s;
    p2->s = temp.s;
}
```

(A) abcd (B) efgh (C) ijkl (D) fgh (E) jkl

12. Suppose we digitize voice at 8000 samples/s, where each sample is 1 byte. How long will it take to fill a 500-byte packet?

(A) 32ms (B) 46.5ms (C) 62.5ms (D) 87ms (E) 112.5ms

13. Which address class is the IP-address 135.104.5.2?

(A) Class A (B) Class B (C) Class C (D) Class D (E) Class E

14. What is the Hamming distance between "101101" and "011101"?

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

15. What is the rate (Mbps) of a DS3 link?

(A) 8.448 (B) 34.368 (C) 44.736 (D) 139.264 (E) 274.176

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16. A binary signal of rate 500bps is to be transmitted over a communications channel. Assume that only the fundamental frequency of the worst-case sequence is to be received, what is the minimum bandwidth required?
(A) 0-75 Hz (B) 0-145Hz (C) 0-250 Hz (D) 0-325Hz (D) 0-500 Hz

17. Consider an asynchronous data link with one start bit and two stop bits per character and a single start-of-frame and end-of-frame character per message. What is the number of additional bits required to transmit a message comprising one hundred 8-bit characters?
(A) 278 (B) 316 (C) 322 (D) 416 (E) 474

18. A series of 8-bit message blocks is to be transmitted across a data link using a CRC for error detection. A generation polynomial of 11001 is to be used. Which of the following will be transmitted for the message 11100110?
(A) 111001100110 (B) 111001101010 (C) 111001101100
(D) 111001100011 (E) 111001100111

19. Which of the following is NOT a process maturity level defined by the Software Engineering Institute?
(A) initial (B) repeatable (C) defined (D) managed (E) approved

20. Deduction in Prolog is based on the concept of unification. Two expressions E and F are said to be unifiable if there are substitutions for the variables of E and F that make the expressions lexically identical. In the following three expressions, only W, X, Y, and Z are variables.
I. f(W, W)
II. f(X, 1)
III. f(Y, g(Z))
Which of these expressions is (are) pairs of unifiable expressions?
(A) (I, II) only
(B) (I, III) only
(C) (II, III) only
(D) (I, II) and (I, III) only
(E) (I, II), (I, III), and (II, III)

21. A regular expression that denotes all strings of 0's and 1's that have at least two consecutive 1's is
(A) (0+10)*11(10+0)* (B) (0+1)*11(0+1)* (C) (0+1)*10*1(0+1)*
(D) 0*11(0+10)*(0+1)* (E) (0+11)*

22. Assume that a data file has an index consisting of N items, where N is large. If a binary search of the index is used to find an item, then, of the following, which best approximates the mean number of comparisons required to locate a specific index entry?
(A) (N+1)/2 (B) N(N-1)/2 (C) $(\log_2 N)-1$ (D) $N\log_2 N$ (E) $(N+1)/\log_2 N$

23. A relation can be defined by giving the ordered pairs of elements for which the relation holds. If the relation R over {a, b, c} is given by R = {(a, a), (a, b), (b, a), (b, b), (c, c)}, which of the following properties does R have?
I. Symmetry II. Antisymmetry III. Reflexivity IV. Transitivity
(A) None (B) II and III only (C) II and IV only
(D) I, III, and IV (E) II, III, and IV

35. Data management, model management, and dialog management are the major components of this system that a manager can use interactively to retrieve and manipulate relevant data.
(A) Decision reporting system
(B) Management decision system
(C) Decision support system
(D) Management reporting system
(E) Management information system

36. Which of the following is not a true statement?
(A) Two different users might access the same server using completely different client applications with different user interfaces.
(B) In a client/server model, the client might reside on your PC or the host computer.
(C) Working with Internet applications is the same as working with word processors or spreadsheets because of the distributed nature of the Internet and the client/server model used by most Internet applications.
(D) In a client/server model, the server might reside on the same host computer as the client, or another host computer elsewhere on the network.
(E) All of the above statements are true.

37. Which of the following is a true statement?
(A) With object-oriented graphics, when moving and removing parts of pictures it is easier to work with regions rather than objects, especially if those objects overlap.
(B) Object-oriented graphics magnify pixels for fine detail editing and bit-mapped graphics magnify objects.
(C) With bit-mapped graphics the printer's resolution is limited only by the output device.
(D) All of the above statements are true.
(E) None of the above statements are true.

38. PC waveform audio recordings often lack the crystal-clear fidelity of compact disk recordings due to differences in the
(A) hardware medium rate.
(B) waveform rate.
(C) sampling rate.
(D) digitizing rate.
(E) signaling rate.

39. These fonts are stored in the printer's ROM and are always available for use with that printer.
(A) scalable outline fonts
(B) screen fonts
(C) printer fonts
(D) soft fonts
(E) bit-mapped fonts

40. Which of the following is not a WIMP advantage?
(A) they are forgiving
(B) they use a command-line interface
(C) they are protective
(D) they are consistent
(E) they are flexible

41. Adding together different amounts of red, green, and blue light to form colors is called
(A) mixing synthesis.
(B) additive color synthesis.
(C) subtractive synthesis.
(D) Both B and C are correct.
(E) None of the above is correct.

42. Using multiple processors to divide jobs into pieces, and work simultaneously on the pieces is
(A) multitasking.
(B) doubling.
(C) parallel processing.
(D) concurrency.
(E) RISC processing.

43. Which of the following can be described as a gateway with a lock that guards against unauthorized access to an internal network?
(A) a firewall
(B) a drawbridge
(C) access-control software
(D) an electronic guard dog
(E) None of the above is correct

44. The traditional type of cryptosystem used on computer networks is the
(A) encoded secret key system.
(B) symmetric secret key system.
(C) decrypted secret key system.
(D) encrypted secret key system.
(E) enforced secret key system.

45. In this type of network, each user can make files publicly available to other users on the network.
(A) LAN model
(B) client/server model
(C) NOS
(D) peer-to-peer model
(E) None of the above is correct.

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46. Which of the following is a server-side, HTML embedded scripting language used to create dynamic Web pages. It can perform any task any CGI program can do, but its strength lies in its compatibility with many types of databases.
(A) SSI
(B) JavaScript
(C) PHP
(D) VBScript
(E) Java applet

47. What is the result of performing a one-bit left circular shift on 5C (which is represented in hexadecimal notation)? Give your answer in hexadecimal form.
(A) 57
(B) B8
(C) 6F
(D) 6A
(E) None of the above is correct.

48. An organization that tends to limit its decision making to following the standard operating procedures developed over time has a
(A) political style.
(B) bureaucratic style.
(C) rational style.
(D) garbage can style.
(E) reflective style.

49. The following bytes were originally coded using odd parity. In which of them do you know that no error has occurred ?
(a) 10101101 (b) 10000001 (c) 00000000 (d) 11100000
(A) a b
(B) b c
(C) a d
(D) c d
(E) a c.

50. Which of the following travels independently over computer networks, seeking out uninfected workstations to occupy?
(A) worm
(B) logic bomb
(C) Trojan horse
(D) stalker
(E) macro virus

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一、試問堆疊(Stack)可應用在程式執行及編譯器(Compiler)中的哪些方面呢？並舉例說明之。 (10 分)

二、雙向連結串列(Double Linked List)一般大多以動態節點(Linked Representation)方式表示，試問如何以陣列(Array)方式表示呢？並舉例說明增減節點之過程。另外，試比較以動態節點及陣列方式來表示的優缺點。 (20 分)

三、假設某一個二元樹(Binary Tree)的節點結構包含 LLink、Data 及 RLink 等 3 部份，其中 LLink 及 RLink 是用來指向二元樹左右節點的，Data 是用來儲存資料的，試各以遞迴(Recursive)及非遞迴(Non-Recursive)方式寫出二元樹中序(Inorder)搜尋的演算法。 (20 分)

四、假設某一個二元樹(Binary Tree)的節點結構包含 LLink、Data、RLink 及 ELink 等 4 部份，其中 LLink、Data 及 Rlink 與第三題相同，而 ELink 是用來指向沒有使用(已被刪除)的節點，試問此節點結構是否恰當？並說明其優缺點及理由。 (10 分)

五、假設有 4 個矩陣 A1、A2、A3、A4，而它們的大小分別為 A1：10 x 20、A2：20 x 1、A3：1 x 40、A4：40 x 5，今擬計算 A1 x A2 x A3 x A4

a) 試問總共有多少種計算方式，並請約略說明之。 (5 分)

b) 試問是否能夠從上述所有計算方式中找出一個最佳(最快)的計算方式？並說明其理由。 (15 分)

六、試寫出一個可以解決最短路徑的演算法。 (20 分)

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7. 若 $M_n = \begin{pmatrix} b & b & 0 & & \\ b & b & b & & \\ & b & b & \ddots & \\ & & \ddots & \ddots & b \\ 0 & & & b & b \end{pmatrix}_{n\times n}$, $b>0$,

D_n 表 M_n 的行列式值，試以 recurrence relations 表 D_n 間關係，並求其解。(10分)

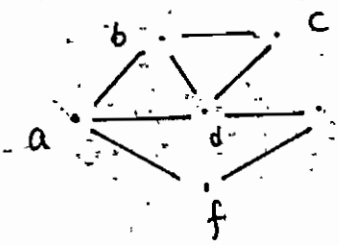
8. $S\neq\phi$, $A\subseteq S$, $I_A(x) = \begin{cases} 1 & \text{若 } x\in A \\ 0 & \text{若 } x\notin A \end{cases}$

試以 I_A, I_B 定義 $I_{A\Delta B}$, $I_{A\cap B}$。(10分)

9. $\mathbb{Z}_2[x]$ 為所有係於 $\mathbb{Z}_2$ 的多項式所成的集合。

a) 試証 $f(x)=x^2+x+1$ 為一不可分解 (irreducible) 多項式。

b) 試問 $\mathbb{Z}_2[x]/(x^2+x+1) = ?$ (10分)

10. 

在左圖中，以点表鄉鎮，連表聯絡道路。若希望每一鄉鎮自行設立醫院，或相鄰鄉鎮有設醫院，試問有幾種方法可以最少醫院數來佈建醫療網？(10分)