中國文化大學 97 學年度轉學招生考試

系組：資訊科學系三年級　　日期節次：7 月 30 日第 3 節 13:30-14:50

科目：**離散數學**　　(124-139)

單選題 無倒扣 每題 5 分

1. What is fundamental theorem of arithmetic?

(A) A positive integer n greater than 1 is composite if and only if n has a divisor d satisfying $2 \le d \le \sqrt{n}$

(B) Any integer greater than 1 can be written as a product of primes.

(C) The number of primes is infinite

(D) For any positive integers m and n, gcd(m,n)*lcm(m,n)= mn

2. Compute the hexadecimal number 4A+B4

(A) FE

(B) EF

(C) EE

(D) FG

3. How many mod operations are there when using Euclidean algorithm to find gcd(504,306), mod is modulus operation.

(A) 5

(B) 7

(C) 4

(D) 3

4. How many mod operations are there when using Euclidean algorithm to find gcd(273,110)

(A) 5

(B) 7

(C) 4

(D) 3

5. p and q are primes. z=pq. $\phi = (p-1)(q-1)$, $0 \le a \le z-1$, The security of RSA rest primarily on

(A) The number of primes is infinite

(B) $a^u \bmod z = a$ for all $0 \le a \prec z$ and u mod $\phi = 1$

(C) the inability of knowing z to discover p and q

(D) none of the above

6. (Pigeonhole principle) Let f be a function from a finite set X into a finite set Y. Suppose that $|X|$=n and $|Y|$=m. Then there are at least k values $a_1, a_2, ...a_k \in X$ such that

$f(a_1) = f(a_2) = ... = f(a_k)$

(A) k=$\lceil n/m \rceil$

(B) k=$\lfloor m/n \rfloor$

(C) k=$\lceil n/(m+1) \rceil$

(D) k=$\lfloor m/(n+1) \rfloor$

7. Convert the decimal number 456 to octal

(A) 710

(B) 701

(C) 720

(D) 702

8. $a_n = 6a_{n-1} - 8a_{n-2}, a_0 = 1, a_1 = 0$, the solution is $a_n = x^{n+1} - y^n$, x+y=?

(A) 3

(B) 4

(C) 5

(D) 6

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9. $2a_n = 7a_{n-1} - 3a_{n-2}, a_0 = 1, a_1 = 1$, the solution is $a_n = (x^{2-n} + y^n)/z$, x+y+z=?

(A) 8
(B) 9
(C) 10
(D) 11

10. $a_n = -8a_{n-1} - 16a_{n-2}, a_0 = 2, a_1 = -20$, the solution is $a_n = x(-4)^n + yn(-4)^n$, x+y=?

(A) 3
(B) 4
(C) 5
(D) 6

11. $a_n = -3a_{n-1}, a_0 = 2$, the solution is $a_n = x(y)^n$, x+y=?

(A)- 3
(B) -1
(C) 2
(D) 4

12. Which one is wrong?

(A)The worst case time for binary search for input size n is $\Theta(\lg n)$

(B) The best, average and worst time are different for selection sort.

(C) The worst case time for merge sort for input size n is $\Theta(n \lg n)$

(D) The worst time for selection sort is $O(n^2)$.

12. Which one is wrong?

(A)The worst case time for binary search for input size n is $\Theta(\lg n)$

(B) The best, average and worst time are different for selection sort.

(C) The worst case time for merge sort for input size n is $\Theta(n \lg n)$

(D) The worst time for selection sort is $O(n^2)$.

13.

Program	# of lines	# of "return"	# of function calls
1	66	20	1
2	41	10	2
3	68	5	8
4	90	34	5
5	75	12	14

Construct the dissimilarity using city block distance. If the threshold is set as 19, then the final classes are?

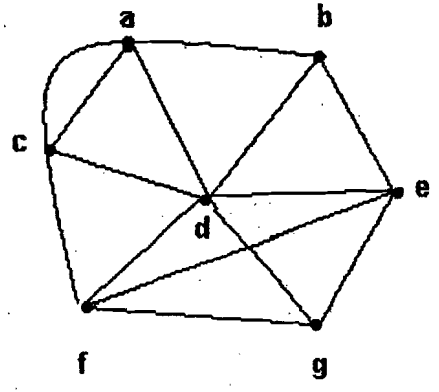
(A) {1,3,5},{2},{4}

(B) {1,3},{5},{2,4}

(C) {1},{2},{3},{4},{5}

(D) {1,3,5},{2,4}

14. The total degrees of the following graph is



(A) 22

(B) 24

(C) 26

(D) 28

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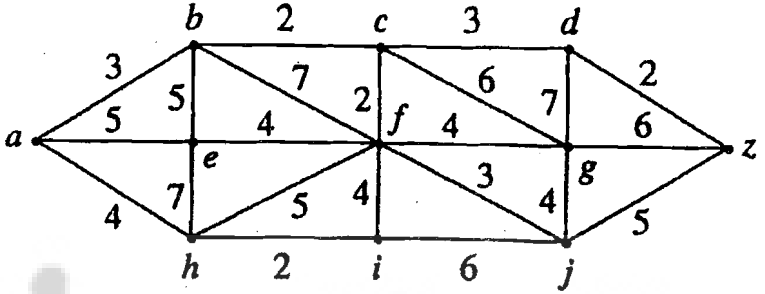
15. The length of the shortest path from a to z is x and the length of the shortest path from h to d is y.　x+y=?



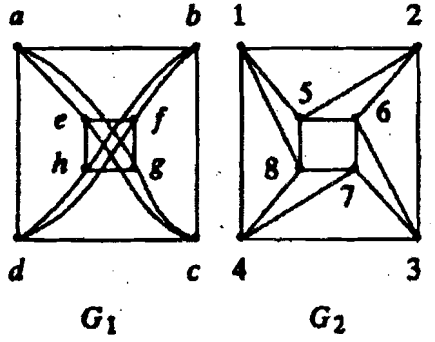
(A) 19

(B) 20

(C) 26

(D) 29

16. which one is right?



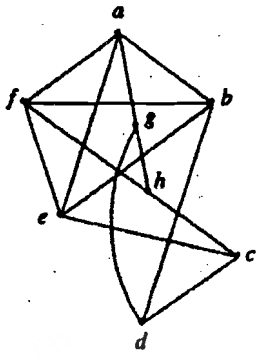
(A) G1 and G2 are isomorphic

(B) G1 and G2 are not isomorphic because some vertex degrees are different

(C) G1 and G2 are not isomorphic because number of edges are different

(D) G1 and G2 are not isomorphic because the length of simple cycle is invariant

17. which one is right?



G

(A) G is a planar graph

(B) G is not a planar graph because G contains a subgraph homeomorphic to K_5

(C) G is not a planar graph because G contains a subgraph homeomorphic to $K_{3,3}$

(D) G has e edges, v vertices and faces f and $f = e - v + 2$

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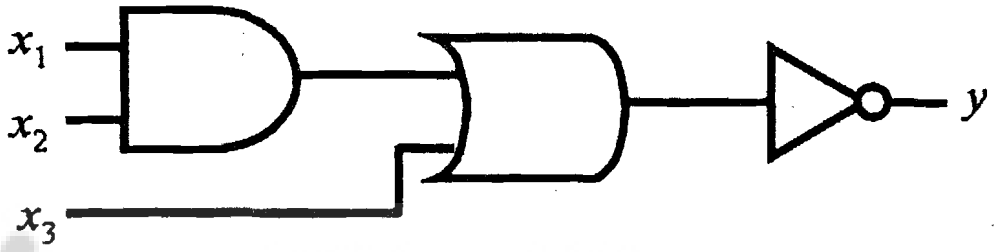
18.



the corresponding logic table is

x1	x2	x3	y
1	1	1	a
1	1	0	b
1	0	1	c
1	0	0	d
0	1	1	e
0	1	0	f
0	0	1	g
0	0	0	h

Transform the binary "abcdefgh" to decimal.

(A) 21

(B) 22

(C) 20

(D) 10

19. ⊕ is exclusive OR

x1	x2	x1 ⊕ x2
1	1	a
1	0	b
0	1	c
0	0	d

Transform the binary "abcd" to decimal.

(A) 1

(B) 6

(C) 4

(D) 10

20. Find the disjunctive normal form of f.

x	y	z	$f(x, y, z)$
1	1	1	1
1	1	0	0
1	0	1	0
1	0	0	1
0	1	1	0
0	1	0	0
0	0	1	0
0	0	0	1

(A) $xyz \vee x\bar{y}\bar{z} \vee \bar{x}\bar{y}\bar{z}$

(B) $\bar{x}yz \vee x\bar{y}z \vee \bar{x}\bar{y}\bar{z}$

(C) $xy\bar{z} \vee x\bar{y}z \vee \bar{x}\bar{y}\bar{z}$

(D) $xyz \vee x\bar{y}z \vee xy\bar{z}$

本試題採双面印刷