

Part I (60%). 第 1-20 題為單選題, 每題 3 分, 答錯不倒扣

1. Which of the following is correct in C++?

- (1) In private inheritance, the private members of the base class are accessible by the derived class.
- (2) In protected inheritance, the public members of the base class are not accessible by the derived class.
- (3) In public inheritance, protected members in the base class become private members in the derived class.
- (4) None of the above.

2. Which of the following is not correct regarding C++ templates?

- (1) Type parameters of a class template can have default arguments.
- (2) It is illegal to have non-type template parameters.
- (3) Function templates are used to perform identical operations on different types of data
- (4) Each template parameter is preceded by keyword class or keyword typename.

3. Assume the following declarations in C++:

```
int a[ 10 ];  
int* b;  
b = a;
```

Which of the following is correct?

- (1) &a[1] is same as b+1
- (2) a[2] is same as &(b+2)
- (3) a[3] is same as *(b+3)
- (4) none of the above.

4. What is “operator overloading”?

- (1) To re-define built-in operators in a programming language (i.e. C++) to work with objects.
- (2) An event which arises when a computer is overheated.
- (3) A C++ program to process data in parallel.
- (4) A strategy in C++ to avoid deadlock.

5. What is the “dangling pointer” problem?

- (1) A pointer which points to itself and therefore the pointer is useless.
- (2) A memory location in which no one refers to it. Thus it cannot be reused by the system.
- (3) A pointer to a memory location where the object/variables on the location was

注意: 背面有試題

- deleted.
- (4) None of the above.
6. Which of the following is an imperative programming language?
- (1) Ada
 - (2) Scheme
 - (3) LISP
 - (4) SQL
7. Which of the following is not a factor of software quality?
- (1) Fatigability
 - (2) Usability
 - (3) Portability
 - (4) Code reusability
8. Which of the following is not correct?
- (1) In a random list, data can only be added or deleted at the beginnings or the ends of the structure.
 - (2) A First-In-First-Out list is generally called a queue.
 - (3) An empty list contains only a null pointer.
 - (4) A stack usually supports two operations: push and pop.
9. Assume an image is represented by mostly 0s and some 1s. Use the run-length encoding algorithm to compress the string "000001000110000001000". By using a 4-bit binary number for counting, the output should be:
- (1) 0101 1011 1000 1110 1011
 - (2) 0101 0011 0000 0110 0011
 - (3) 0101 1010
 - (4) 0001 0001 1101 0000
10. Which of the following is true regarding object-oriented programming?
- (1) Polymorphism is the idea to combine primitive functions to create new functions.
 - (2) Inheritance is the idea to tie objects and methods together as a whole.
 - (3) Encapsulation is the idea of hiding data and some operations that can be performed on the data inside the object.
 - (4) None of the above.
11. Which of the following is true about computer security?
- (1) Given the same length of key(s), public key encryption is usually slower than secret key encryption.

注意：背面有試題

- (2) In public key encryption, the message receiver's a private key is used in decryption of the message.
- (3) In digital signature, a message digest is encrypted using the message receiver's public key.
- (4) In secret key encryption, two different keys are used in encryption and in decryption accordingly.

12. Which of the following is true?

- (1) In a digraph, there is no direction on any of the lines, which are known as edges.
- (2) The degree of a vertex is the number of lines incident to it.
- (3) A digraph is strongly connected if at least two vertices are not connected.
- (4) A cycle is a path consisting of at least two adjacent vertices.

13. Which one of the followings is not a possible state of the process scheduler of the operating system?

- (1)wait (2)communicating (3)running (4) ready

14. Which one of the following I/O synchronization methods make CPU constantly check and wait for the I/O device to finish the jobs?

- (1)Programmed I/O (2) I/O interrupt (3) DMA (4) none of the above

15. Which one of the followings is not a common I/O controller?

- (1)USB (2)SCSI (3)FireWire (4)XML

16. Which one of the followings is not part a usual system bus?

- (1)Security bus (2)Data bus (3)Address bus (4)Control bus

17. Which one of the following memory is not erasable?

- (1)DRAM (2)PROM (3)EPROM (4)SRAM

18. Which one of the following 16-bit 2's complement pattern is the representation of the decimal number -179?

- (1)1111111101001100 (2)1000000010110011 (3)000000001001101
- (4)1111111101001101

19. In 2's complement addition, if there is a final carry after the leftmost column addition, we should:

- (1)discard it.

注意:背面有試題

- (2)add it to the rightmost column.
- (3)add it to the leftmost column.
- (4)increase the bit length.

20. Which one of the following signal encoding step assigns a value to a sample?

- (1) modulization (2) quantization (3)presentation (4)enclosing

Part II (40%). 問答程式題, 各題分數標於題號前

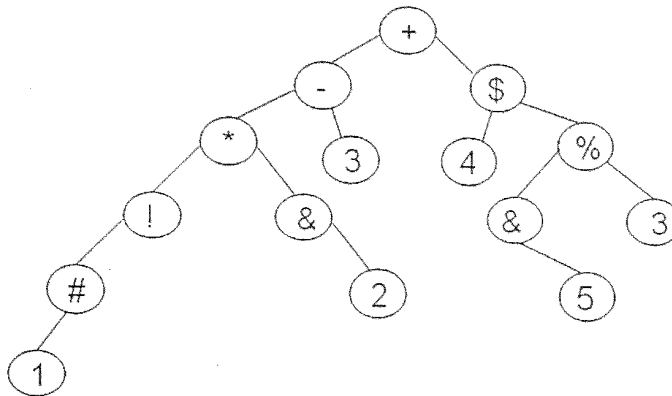
21.(10%) The halting problem is not solvable. Use the concept of Gödel Number to show it.

- (5%) (I) Describe the halting problem.
- (5%) (ii) Show the halting problem is unsolvable.

22. (10%) Use C++, C, or Java to write a program which reads an integer x from standard input and sends the result of a given function --- $F(x)$ to the standard output. $F(x)$ is defined as follows:

$$\begin{cases} F(x) = F(x-1)/F(x-2) + F(x-3) & \text{if } x \geq 2 \\ F(x) = 1 & \text{if } x < 2 \end{cases}$$

23. (9%) Given a binary tree as follows, show how to traverse it with different approaches.



- Q3.1. (3%) Preorder
- Q3.2. (3%) Inorder
- Q3.3. (3%) Postorder

注意: 背面有試題

24.(4%) What is the starvation situation that the operating system's process management must solve?

25.(3%) What are the steps of a machine cycle?

26.(4%) What is the advantage of the vector graphic method over the bitmap graphic method?