

科目 計算機概論 類組別 A4 021

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* 請在試卷、答案卡內作答

【單選題，每題 2 分，共 50 分。】

1. The _____ creates object code and stores it on disk.
 - a. Linker.
 - b. Compiler.
 - c. Preprocessor.
 - d. Loader.
2. The linker links:
 - a. The source code with the object code
 - b. The object code with the external libraries
 - c. The executable code with primary memory
 - d. The primary memory with the CPU
3. Converting from type _____ to type _____ will result in the loss of data.
 - a. bool, char.
 - b. float, double.
 - c. int, char.
 - d. short, long.
4. Each standard library has a corresponding:
 - a. Function.
 - b. Variable type.
 - c. Header file.
 - d. Cd-rom.
5. Which of the following statement is **False**?
 - a. An array is a random-access structure.
 - b. A sequential list is a random-access structure.
 - c. A linked list is a random-access structure.
 - d. A stack is not a random-access structure.
 - e. None of the above
6. Which of the following statement is **True**?
Recursive functions :
 - a. often have fewer local variables than the equivalent nonrecursive routines.
 - b. generally use *while* or *for* statements as their main control structure.
 - c. are possible only in languages with static storage allocation
 - d. should be used whenever execution speed is critical.
7. Which of the formulas gives the maximum number of nodes in the *N*th level of a binary tree?
 - a. $N^2 - 1$
 - b. 2^N
 - c. $2^{N+1} - 1$
 - d. 2^{N+1}
 - e. None of the above
8. What value does function *mystery* return when called with a value of 4?

```

int mystery ( int number )
{
    if ( number <= 1 )
        return 1;
    else
        return number * mystery( number - 1 );
}

```

- a. 0.
- b. 1.
- c. 4.
- d. 24.

注： 意：背面有試題

9. Recursion is memory-intensive because:
- Recursive functions tend to declare many local variables.
 - Previous function calls are still open when the function calls itself and the activation records of these previous calls still occupy space on the call stack.
 - Many copies of the function code are created.
 - It requires large data values.
10. All of the following are reasons to use recursion except:
- An iterative solution is not apparent.
 - The resulting program is easier to debug.
 - It more naturally mirrors the problem.
 - It maximizes execution performance.
11. Given that k is an integer array starting at location 2000, kPtr is a pointer to k and each integer is stored in 4 bytes of memory, what location does kPtr + 3 point to?
- 2003.
 - 2006.
 - 2012.
 - 2024.
12. Every object of the same class:
- Gets a copy of every member function and member variable.
 - Gets a copy of every member variable.
 - Gets a copy of every member function.
 - Shares pointers to all member variables and member functions.
13. Which of the following is not true of object-oriented design?
- OOD takes advantage of inheritance relationships.
 - OOD encapsulates attributes and operations into objects.
 - OOD focuses on actions (verbs).
 - Each class can be used to create multiple objects.
14. Select the false statement regarding inheritance.
- A derived class can contain more attributes and behaviors than its base class.
 - A derived class can be the base class for other derived classes.
 - Some derived classes can have multiple base classes.
 - Base classes are usually more specific than derived classes.
15. Polymorphism is implemented via:
- Member functions.
 - virtual functions and dynamic binding.
 - inline functions.
 - Non-virtual functions.
16. Abstract classes:
- Contain at most one pure virtual function.
 - Can have objects instantiated from them if the proper permissions are set.
 - Cannot have abstract derived classes.
 - Are defined, but the programmer never intends to instantiate any objects from them.
17. The main difference between a pure virtual function and a virtual function is:
- The return type.
 - The member access specifier.
 - That a pure virtual function cannot have an implementation.
 - The location in the class.

18. Assuming that all four of the following functions are defined, which one will be called by the function call `square( 23.4 )`?
- `template< typename T >
T square(T num).`
 - `template< typename T1, typename T2 >
T1 square(T1 num1, T2 num2).`
 - `int square( int num ).`
 - `double square( double num ).`
19. An algorithm that requires _____ operations to complete its task on n data elements is said to have a linear runtime.
- $n^3 + 9$.
 - $3n^2 + 3n + 2$.
 - $2n + 1$.
 - 6.
20. Which of the following is not a dynamic data structure?
- Linked list.
 - Stack.
 - Array.
 - Binary tree.
21. _____ is not an advantage of linked lists when compared to arrays.
- Dynamic memory allocation.
 - Efficient insertion and deletion.
 - Direct access to any list element.
 - No need to allocate extra space, "just in case."
22. A stack is initially empty, then the following commands are performed:
- ```
push 5
push 7
pop
push 10
push 5
pop
```
- Which of the following is the correct stack after those commands (assume the top of the stack is on the *left*)?
- 5 10 7 5.
  - 5 10.
  - 7 5.
  - 10 5.
23. In general, which of the following contains the most amount of data?
- A database.
  - A file.
  - A byte.
  - A field.
24. Given that the line
- ```
delete newPtr;
```
- just executed, what can you conclude?
- The memory referenced by `newPtr` is released only if it is needed by the system.
 - The pointer `newPtr` is of type `void *`.
 - The pointer `newPtr` only exists if there was an error freeing the memory.
 - The pointer `newPtr` still exists.
25. Two structure variables of the same type with the same member values, when compared will:
- Always compare equally.
 - Never compare equally.
 - Sometimes compare equally.
 - Result in a compile error.

【非選擇題，共 50 分】

26. Please explain the following memory management techniques. 請解釋下列的記憶體管理方法：

- Paging (5%)
- Demand Segmentation (5%)
- Monoprogramming (5%)
- Virtual Memory (5%)

27. What is the binary representation of $(12.75)_{10}$ in IEEE single precision floating point format? Notice that Sign=1 bit, Exponent=8 bits in Excess_127, and Mantissa=23 bits. (8%)

28. A computer uses 2's complement to represent a negative integer. Let X and Y be two 8-bit signed integers in the computer, where

X= 0011 0011 and Y= 0110 1111

Then X-Y=? Show details of how you calculate it. (7%)

```
class Cell {
public:
    Cell(int v) {value=v;}
    void set(int v) {value=v;}
    int get() {return value;}
private:
    int value;
};

Cell& multiply(Cell *a, Cell *b) { ... }
```

Figure 1. The definition of class *Cell* and the format of function *multiply* in C++.

29. Consider the C++ program in Figure. 1. Use class *Cell* to design a global function multiply which multiplies the values of *Cell *a* and *Cell *b*, and returns a reference to a new *Cell* object that has the result. (10%)

請參考 Figure. 1，使用 class *Cell* 去設計一個函式 *multiply* 去計算 *Cell *a* 和 *Cell *b* 所指向的內容的 value 的乘積，然後回傳一個含有這個計算結果的新 *Cell* 物件。

```
...
int main() {
    int i=0, sum=0;
    for (int j = 0; j < 100; j++) {
        while (i <= 5) {
            i++;
            if (i==2) {continue;}
            if (i==4) {break;}
            sum=sum+i;
        }
    }
    printf("%d\n",sum);
    return 0;
}
```

Figure 2. A loop-control program in C.

30. What is the result of executing the C program in Figure 2? Please show details of how the program works. (5%)

執行 Figure 2 的程式後會產生什麼結果？請列出該程式計算過程的細節。