國立政治大學 110 學年度碩士班暨碩士在職專班招生考試試題

考試科目	計算機概論與程式設計	系所別	數位內容碩士學位學程資訊應用組	考試時間	2月 4日(四) 第四節

Multiple Choice Questions (only one correct answer) (40%)

1. Which of the following layer is **not** in the 7-layer Open Systems Interconnection (OSI) model?
   (A) Session
   (B) Connection
   (C) Presentation
   (D) Data link
   (E) None

2. Which of the following image compression is **lossy** compression?
   (A) GIF
   (B) PNG
   (C) TIFF
   (D) JPEG
   (E) None

3. Which of the following memory device is **faster** for accessing data?
   (A) ROM
   (B) SSD
   (C) RAM
   (D) HDD
   (E) Cache

4. For iteration and recursion, which is **faster** when computing a large Fibonacci number?
   (A) Iteration
   (B) Recursion
   (C) Equal
   (D) None

5. For recursion, a function fib( ) is defined to compute the Fibonacci number. How many times the function is called for fib(6)?
   (A) 12
   (B) 13
   (C) 14
   (D) 15
   (E) 16

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6. Which of the following number is the largest one?
   (A) 11011011 in 2's complement
   (B) 10010110 in binary
   (C) A9 in Hexadecimal
   (D) 235 in Octal
   (E) 01111001 in 1's complement

7. For the sorting methods with the same time complexity in best, average and worst cases in the following, which one has both the **smallest** time and space complexity in worst case?
   (A) Selection sort
   (B) Quick sort
   (C) Merge sort
   (D) Insertion sort
   (E) Heap sort

8. Which of the following expression is **different** from the others if A: True, B: False, C: False, D: True?
   (A) (A OR B) AND (C AND D)
   (B) (A NAND B) XOR (C NOR D)
   (C) (A XOR (NOT B)) XOR (C AND D)
   (D) (A AND D) XOR (B OR C)
   (E) None

9. Which of the following operator has the **highest** precedence?
   (A) ++
   (B) &&
   (C) = =
   (D) *
   (E) >

10. In the following statements

```
int a = 0;
for (int i = 0; i < 100; i++){
   for (int j = 0; j < 10; j++){
      if (i > 3){
```

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```
        break;
      }
      if (j > 2 && j < 8){
        continue;
      }
      else if(j > 8 && i > 0){
        j *= i;
      }
      i += i%7;
      a++;
    }
  }
```

which of the following choice is the **correct** answer of **a**?

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

Please answer the following questions. For answers in code, any programming language (but not mixed) or pseudocode is allowed. (60%)

1. There are two objects, a circle and a square, moving in a 2D game. The center position (c_x, c_y) and the radius r of the circle are known. The upper-left point (s_x, s_y) and the edge length e of the square are known. Please define a collision detection function "**collidetec**" with six float parameters (cx, xy, r sx, sy, e) as mentioned above and a boolean return value to detect whether the collision is between these two objects. Notably, the objects are only moving but not rotating. Furthermore, the power function (次方) is the only function allowed to be used without defining it. Please also briefly describe your code, pseudocode and algorithm. (20%)

2. In object-oriented programming (OOP), public, private and protected are common access modifiers for the members (variables and functions) in a class. They are important for inheritance. Please describe what is inheritance and the difference among **public**, **private** and **protected** members. (10%) Furthermore, three kinds

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of inheritance, **public**, **private** and **protected** inheritance, are in C++. Please draw a figure or table to show how **public**, **private** and **protected** members in the base class become in the derived class through **public**, **private** and **protected** inheritance. (10%)

3. A sequence of numbers {1, 5, 9, 18, 25, 36, 42, 74, 89, 97} is in an array b. Please draw the procedure of finding the number 18 using binary search (10%) and write down the corresponding code using recursion. (10%)

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。