

系別：資訊工程學系三年級

科目：程式語言

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**Section A: Multiple Choice Questions (40 Points in Total)**

The following questions are related to programming in C, C++, and general concepts in programming languages. Please choose one answer for each question.

Each question is weighted 4 points.

1. To prevent a compile-time error, how should the following code be changed?

```
struct ListNode // Line 1
{ // Line 2
    int dataVal; // Line 3
    NodePtr next; // Line 4
}; // Line 5
```

- Insert the following before line 1:  
typedef ListNode\* NodePtr;
- Insert the following before line 1:  
struct ListNode;  
typedef ListNode\* NodePtr;
- Replace line 4 with the following:  
ListNode\* next;
- Do either b or c above.
- Do any of a, b, or c above.

2. Given the code fragment

```
struct NodeType
{
    int data;
    NodeType* link;
};
NodeType* p;
NodeType* q;
p = new NodeType;
p->data = 12;
p->link = NULL;
q = new NodeType;
q->data = 5;
q->link = p;
```

which of the following expressions has the value 12?

- q
- q->data
- q->link->data
- q->link
- none of the above

3. If the following function is called with a value of 2 for n, what is the resulting output?

```
void Quiz( /* in */ int n )
{
    if ( n > 0 )
    {
        cout << 0;
        Quiz( n - 1 );
        cout << 1;
        Quiz( n - 1 );
    }
}
```

- 00011011
- 11100100
- 10011100
- 01100011
- 001101

4. Which of the following statements about a class inheritance hierarchy is true?

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- a. Each class is more specialized than the one directly above it.
- b. Each class is less specialized than the one directly above it.
- c. Each class inherits the properties from classes below it.
- d. a and c above
- e. b and c above

5. If two C++ class objects point to different dynamic data structures and a shallow copy is used to copy one class object to another, what is the result?

- a. a dangling pointer
- b. a memory leak
- c. a null pointer
- d. termination of the program
- e. duplicate copies of not only the class objects but also the pointed-to data

6. Suppose that a class Fribbit has a constructor, a destructor, and two private data members:

```
class Fribbit
{
    public:
        // Some public operations
        Fribbit( /* in */ char* initialString,
              /* in */ int  initialN    );
        ~Fribbit();
    private:
        char* str;
        int  n;
};
```

The str member points to a C string that is dynamically allocated by the class constructor. Which of the following code segments is the correct body for the class destructor?

- a. delete [] str;
- b. delete [] str;
 delete n;
- c. delete Fribbit;
- d. str = '\0';
- e. str = '\0';
 n = 0;

7. In C++ terminology, which of the following is *not* considered "initialization"?

- a. passing a class object as an argument using a pass by value
- b. copying one class object to another in an assignment statement
- c. initializing one class object by another in its declaration
- d. returning a class object as a function value
- e. All of the above are considered initialization.

8. A C++ copy-constructor is implicitly invoked whenever

- a. a class object is initialized in its declaration by another class object.
- b. a class object is passed as an argument using a pass by value.
- c. one class object is copied to another in an assignment statement.
- d. a and b above
- e. a, b, and c above

9. Suppose that class X has a class member that is an object of another class Y. If classes X and Y both have constructors, in what order will the constructors be executed when an object of class X is created?

- a. First X's constructor is executed, then Y's.
- b. First Y's constructor is executed, then X's.
- c. Both constructors are executed at the same time.
- d. Only X's constructor is executed.
- e. Only Y's constructor is executed.

10. Consider the class declaration

```
class SomeClass
{
```

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```
public:
    void Func();
private:
    int m;
    int n;
};
```

and client code

```
SomeClass alpha;
SomeClass beta;
...
```

Considering both pieces of code above, which identifiers are names of class objects?

- a. m and n
- b. alpha and beta
- c. SomeClass, m, and n
- d. alpha, beta, m, and n
- e. Func, m, and n

## Section B: Multiple Choice Questions (40 Points in Total)

The following questions are related to Java Programming. Please choose one answer for each question. Each question is weighted 4 points.

1. Show the output of running the class Test in the following code lines:

```
interface A {
    void print();
}
class C {}
class B extends C implements A {
    public void print() {}
}
public class Test {
    public static void main(String[] args) {
        B b = new B();
        if (b instanceof A)
            System.out.println("b is an instance of A");
        if (b instanceof C)
            System.out.println("b is an instance of C");
    }
}
```

- a. Nothing.
- b. b is an instance of A.
- c. b is an instance of C.
- d. b is an instance of A followed by b is an instance of C.

2. When you implement a method that is defined in a superclass, you \_\_\_\_\_ the original method.

- a. overload
- b. override
- c. copy
- d. call

3. Analyze the following code:

```
public class Test {
    public static void main(String args[]) {
        Test nc = new Test();
        nc.t = nc.t++;
    }
    int t;
    Test() {
    }
}
```

- a. The program has a compilation error because t is not initialized.  
b. The program does not compile because the parameter list of the main method is wrong.  
c. The program compiles, but has a runtime error because t has no initial value.  
d. The program has a compilation error because you attempt to create an object of the Test inside the Test class.  
e. The program compiles and runs fine.
4. To restrict access of a data member or a method to the class itself:  
a. Use the private modifier.  
b. You cannot use the private modifier with the static modifier.  
c. Use the static modifier.  
d. None of the above.
5. Analyze the following code:  

```
class Test {  
    public static void main(String[] args) {  
        double radius = 5;  
        final static double PI = 3.15169;  
        double area = radius * radius * PI;  
        System.out.println("Area is " + area);  
    }  
}
```

  
a. The program has syntax errors because the variable radius is not initialized.  
b. The program has syntax errors because a static PI is defined inside a method.  
c. The program has no syntax errors but will get a runtime error because radius is not initialized.  
d. The program compiles and runs fine.
6. Assume the signature of the method xMethod is as follows.  

```
public static void xMethod(double[] a)
```

  
Which of the following could be used to invoke xMethod?  
a. xMethod(5);  
b. xMethod({3, 4});  
c. xMethod(new int[2]);  
d. xMethod(new double[2]);  
e. None of the above.
7. Which of the following possible modifications will fix the errors in this code?  

```
public class Test {  
    private double code;  
    public double getCode() {  
        return code;  
    }  
    protected abstract void setCode(double code);  
}
```

  
a. Remove abstract in the setCode method declaration.  
b. Change protected to public.  
c. Add abstract in the class declaration.  
d. b and c.
8. Analyze the following code.  

```
class Test {  
    class Test {  
        public static void main(String[] args) {  
            String[] s = new String[3];  
            System.out.println("s[0] is " + s[0].toString());  
        }  
    }  
}
```

  
a. The program has a syntax error because the size of the array wasn't specified when declaring the Array.  
b. The program has a runtime error because s[0] is null.  
c. The program runs fine and displays s[0] is 0.  
d. None of the above.

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9. What is wrong in the following code?

```
class Test {
    public static void main(String[] args) {
        C c = new C(5,0);
        System.out.println(c.value);
    }
}
class C {
    int value = 2;
}
```

- a. The program has a compilation error because class C does not have a default constructor.
- b. The program has a compilation error because class C does not have a constructor with a double argument.
- c. The program compiles fine, but it does not run because class C is not public.
- d. a and b.

10. Which of the following statement is not true?

- a. The contents of a string can be partially changed.
- b. You can add, insert, or delete characters from a string buffer.
- c. You can create a string buffer from a string.
- d. You can convert a string buffer into a string.
- e. All of the above

## Section C: Programming Examples (20 Points in Total)

1. Show the output of the following C++ program (10 Points):

```
#include <iostream.h>

void mul(int x[][3], int y[][2], int z[][2])
{
    for (int i = 0; i < 2; i++)
        for (int j = 0; j < 2; j++) {
            z[i][j] = 0;
            for (int k = 0; k < 3; k++)
                z[i][j] += x[i][k] * y[k][j];
        }
}

int main(void)
{
    int x[2][3] = { {1, 2, 3}, {4, 5, 6} };
    int y[3][2] = { {1, 5}, {5, 3}, {8, 1} };
    int z[2][2];

    mul(x, y, z);
    for (int i = 0; i < 2; i++) {
        for (int j = 0; j < 2; j++)
            cout << z[i][j] << ' ';
        cout << '\n';
    }

    return (0);
}
```

注意解題時請寫出代碼

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2. Show the output of the following Java program (10 Points):

```
public class Test {  
    public static void main(String[] args) {  
        int i = 1;  
        while (i <= 4) {  
            int num = 1;  
            for (int j = 1; j <= i; j++) {  
                System.out.print(num + "bb");  
                num *= 3;  
            }  
  
            System.out.println();  
            i++;  
        }  
    }  
}
```

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