Final Exam

每題 10 分，共 10 題 from Ming-Syan Chen, January 20, 1999, Good luck!

1. Explain briefly
   a. operator overloading;   b. function overloading;   c. protected data member;
   d. global variable;   e. static variable

2 What is the output of the following ?

```
#include <iostream.h>
int age=5;
class Tree
{    char variety[10];
     int age;
     double height;
     public:
          void input_age()
          { age=::age+2;}
          void print_age()
          {
          cout<<"External age"<<age<<'\n';
          cout<<"Internal age"<<::age <<'\n';


int main()
{    Tree k;
     k.input_age();
     k.print_age();
     return(0);
}
```

3.Use the above program to give an example instance for each of the following (just one for each).
   a. class
   b. object
   c. private data member
   d. member function
   e. dot representation

4. What is the output of the following ?

```
#include <iostream.h>
class Sum
{
     int s;
     public:
          void add()
          {s=3+5;}
          void add (int x)
```

```cpp
            {s=x+5;}
            void add(int x, int y)
            {s=x-y;}
            void print()
            {cout <<"Sum="<<s<<'\n';}
            ~Sum() {cout<<"Leaving"<<s<<'\n';}
};
int main()
{    Sum a;
     a.add();
     a.print();
     a.add(80);
     a.print();
     Sum b;
     b.add(100,27);
     b.print();
     return (0);
}
```

5. What is the output of the following ?

```cpp
#include <iostream.h>
class CLOCK;
class WATCH
    { int hour, minute, second;
    public:
      WATCH() {}
      WATCH( int m, int h, int sec )
          { hour=h; minute=m; second=sec; }
      friend void timing( WATCH *pw, CLOCK *pc );
    };
class CLOCK
    { int hour, minute;
    public:
      CLOCK() {}
      CLOCK( int h, int m ) { hour=h; minute=m; }
      friend void timing( WATCH *pw, CLOCK *pc );
      friend void print( CLOCK *pc );
    };
void timing( WATCH *pw, CLOCK *pc )
    { pc->hour = pw->hour;
      pc->minute = pw->minute;
    }
void print( CLOCK *pc )
    { cout << "The CLOCK time is "
           << pc->hour   << ":"
           << pc->minute << '\n';
    }
int main()
    { CLOCK c( 10, 12 );
```

```cpp
    WATCH w( 11, 30, 20 );
    timing( &w, &c );

    print( &c );
    return(0);
}
```

6. What is the output of the following ?
```cpp
#include <iostream.h>
double salary=2500.5;
double change(double &money)
{ money+=100.0;
  salary+=30;
  return money+money;
}

int main()
{ double x;
    x=change(salary);
    x+=100;
    salary+=50;
    cout<<"x="<<x<<'\n';
    cout<<"salary="<<salary<<'\n';
    return(0);
}
```

7 What is the output of the following ?
```cpp
#include <iostream.h>
class Integer
    { int value;
    public:
      Integer()
         { value = 100; }
      void add( int a )
           { value += a; }
      ~Integer()
         { cout << "Bye!" << '\n';
           cout << "Value = " << value << '\n';
         }
    };

  void sub()
       { Integer y[2];
         y[0].add( 15 );  y[1].add( 20 );
         cout << "------------------\n";
       }
int main()
    {   Integer x[2];
```

```cpp
        x[0].add( 5 );   x[1].add( 10 );
        sub();
      cout << "+++++++++++++++\n";
      return(0);
    }
```

8. What is the output of the following ?
```cpp
#include <iostream.h>
#include <string.h>
class STUDENT
    { char name[12];
      double cobol;
      double java;

      public:
          STUDENT(char na[], double co, double ja)
              { strcpy( name, na );
                cobol = co;   java = ja;
              }
          STUDENT& operator+( STUDENT y )
                  { cobol += y.cobol;   java += y.java;
                    return *this;
                  }
          STUDENT& operator/( int n )
                  { cobol -= n;   java -= n;
                    return *this;
                  }
      void disp()
              { cout << "\nAVERAGE SCORE"
                     << "\n----------------"
                     << "\nCOBOL: "      << cobol
                     << "\nJAVA: ."      << java;
              }
  };

int main()
    {   STUDENT john( "John", 80.0, 92.5),
                jamis( "Jamis", 78.5, 88.5);
      ((john + jamis) / 2).disp();
        john.disp();
      return(0);
    }
```

9. What is the output of the following ?
```cpp
#include <iostream.h>
#include <string.h>
class STUDENT
    { char name[12];
```

```cpp
        double cobol;
        double java;
    public:
        STUDENT(char na[], double co, double ja)
            { strcpy( name, na );
              cobol = co;  java = ja;
            }
        friend STUDENT operator+( STUDENT x, STUDENT y );
        void disp()
                { cout << "\n" << name
                       << "\n------------------"
                       << "\nCOBOL: "    << cobol
                       << "\nJAVA: "     << java;
                }
    };
STUDENT operator+( STUDENT x, STUDENT y )
  { STUDENT working_object("TOT-SCORE", x.java+y.java, x.cobol + y.cobol);
      return working_object;
  }
int main()
      {   STUDENT john( "John", 80.0, 92.5),
            jamis( "Jamis", 78.5, 88.5);
          (john + jamis).disp();
          john.disp();
          return(0); }
```

10. What is the output of the following ?
```cpp
#include <iostream.h>
class Saving
    { double money;
      public:
        Saving( double m )  { money=m; }
        double operator!()  { return 10-money; }
        Saving &operator-()
                { money=10-money;
                   return *this;
                }
    };
int main()
    {
      Saving s(100);
      cout << !s << '\n';
      cout << !(-s) << '\n';
      cout << !(-(-s)) << '\n';
      return(0);
    }
```
Happy Winter Vacation!
Have a Joyable Chinese Lunar New Year!!