StudentID# : (   ) , Name : (   )

* You may answer in either Korean or English

1. (10points) Complete following sentences by filling out the blanks with English words.
(1) One of the important goals of software engineering is to minimize the (__c_____) of software development and maintenance.

(2) Generally, object oriented programming increases
(programmer productivity), (   ), (   ), and (   ).

(3) (   ) is the degree to which each program module relies on each one of the other modules.
 (   ) is a measure of how strongly-related and focused the various responsibilities of a software module are.
  It is desirable to maximize (   ) and minimize (   ).

(4) (   ) member function does not modify any data members of the object on which it is called.

(5) (   ) function of a class has the right to access the non-public members of the class

(6) An abstract class should contain at least one (   ).

(7) (   ) can check whether two classes have inheritance relationship.

2. (6points)
(1) What is encapsulation? Explain.
(   )

(2) List at least two important benefits of encapsulation. You also need to explain why you think so.
(1:   ) , (Why? :   )

(2:   ) , (Why? :   )

3. (6points) There are differences among following three function parameter types (a), (b), and (c). X is a class name and T is a data type.
 (a) `void X::f(T arg)`
 (b) `void X::f(T* argp)`
 (c) `void X::f(const T* argp)`

(1) What are the purposes of using ***** (passing address) in (b) compared to using parameter type (a)? There are two important purposes. Explain.
(purpose1 :   )

(purpose2 :   )

(2) what is the purpose of using **const** in (c) compared to using parameter type (b)? Explain.
(   )

4. (6points) What is the output of the following C++ program ?

```cpp
#include <iostream>
using namespace std;

class B {
public:
  B() { z=-2; }
  B(int z_val) : z(z_val) {}
  virtual int get_val() { return (z-1); };
  int gv2() { return (z-2); }
private :
  int z;
};

class D1 : public B {
public:
  D1() { x=0; }
  D1(int x_val): x(x_val) {}
  int get_val() { return x; };
private:
  int x;
};

class D2 : public B {
public:
  D2() { y=0; }
  D2(int y_val): y(y_val) {}
  virtual int gv2() { return y*y; };
private:
  int y;
};

int main()
{
  B Zero(0);
  D1 Two(2);
  D2 Four(4);

  B* B_Array[3];
  B_Array[0] = &Zero;
  B_Array[1] = &Two;
  B_Array[2] = &Four;

  cout << "0 : " << B_Array[0]->get_val() << endl;
  cout << "1 : " << B_Array[0]->gv2() << endl;
  cout << "2 : " << B_Array[1]->get_val() << endl;
  cout << "3 : " << B_Array[2]->gv2() << endl;

  return 0;
}
```

Output :

5. (2points) What is software crisis? Explain in detail.
(   )