

**2011.2 Object-Oriented Programming and Design**  
**Final Exam (Dec. 19th 7pm-8:20pm)**

supervisor	
signature	

**StudentID# :** (    ), **Name :** (    )

\* You may answer in either Korean or English. As an exception, you can use only English words in problem 1.

1. (22points) Complete following sentences by filling out blanks (a)~(k) with the most appropriate English words.

**You can use only English words in this problem 1. Otherwise, you will get some penalty.**

(1) UML uses mostly (a.) notations to express the object oriented analysis and design of software projects. UML is not (b.) on any one language or technology. UML allows us to acquire an overall (c.) of a system.

(2). “System” is a set of (d.) entities forming an integrated whole.

(3) STL vector implements an array with fast (e.) access and has an ability to automatically (f.) when appending new elements.

(4) Function overloading means a single function name may have several alternative (g.). Typically overloaded names are (h.) at compile time based on their type signature.

(5) An abstract class can only be used as (i.) class.  
An abstract class delegates (j.) responsibility to (k.) class.

2. (8points)

- (1) What is the main difference between synchronous message and asynchronous message in UML? Explain.  
( )

(2) What is the difference between “virtual function” and “pure virtual function”? Explain in details.

3. (8points)

- (1) What is operator overloading? Explain in detail.  
( )

(2) Explain the difference between member function method and non-member function method for operator overloading. Your answer should include the difference in terms of C++ grammars.  
( )

#### 4 (10points)

- (1) What is "container class"? Explain in detail.  
( )

(2) List at least five member functions of STL vector class.  
(a. ), (b. ), (c. ), (d. ), (e. )

6. (22points) Consider following C++ code and its execution input/output result. This program computes and displays an average value of input float-type values. Fill out blanks (a), (b) and (c) with appropriate C++ codes.

<pre>#include &lt;vector&gt; #include &lt;iostream&gt; using namespace std;  // sum adds the values of the vector it is passed. float sum( [a] ) {     [b] }</pre>	<pre>int main() {     vector&lt;float&gt; a; // Declare a vector.     float temp;     while (cin &gt;&gt; temp) {         a.push_back(temp);     }     cout &lt;&lt; "Average = "         &lt;&lt; [c] &lt;&lt; endl;     return 0; }</pre>
	<b>Input :</b> 1.0 1.5 2.0
	<b>Output :</b> Average = 1.5

7. (20points) Write a C++ function "Max" that takes three parameters **x**, **y**, and **z**, and returns the biggest value among the three parameters. Note that **the types of x, y and z are the same** but the type is a generic type. Therefore, **you must use template** to write the "Max" function that can accept any type of parameters as shown in the following sample code.

<pre>#include &lt;iostream&gt; int main() {     int a=3, b=5, c=3 ;     float d=3.5, e=2.3, f=4.1;     std::cout &lt;&lt; Max(a,b,c) &lt;&lt; "," &lt;&lt; Max(d,e,f) &lt;&lt; "\n";     return 0; }  output : 5,4.1</pre>	<b>(Write your Max function here using template.)</b>
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8. (10points) What is the output of the following C++ program to the screen?

<pre>#include &lt;iostream&gt; #include &lt;list&gt; #include &lt;vector&gt; using namespace std;  int main () {     list&lt;int&gt; mylist;     list&lt;int&gt;::iterator it;      // set some initial values:     for (int i=1; i&lt;=5; i++) mylist.push_back(i);      it = mylist.begin();     ++it;      mylist.insert (it,10); }</pre>	<pre>mylist.insert (it,20); --it;  vector&lt;int&gt; myvector (2,30); mylist.insert (it,myvector.begin(),myvector.end());  cout &lt;&lt; "mylist contains:"; for (it=mylist.begin(); it!=mylist.end(); it++)     cout &lt;&lt; " " &lt;&lt; *it; cout &lt;&lt; endl;  return 0; }</pre>
	<b>Output : (PUT YOUR ANSWER HERE)</b>