所別：電機工程學系碩士班 甲組(一般生) 科目：計算機概論
(學位在職生)

1. Explain and compare the primary memory unit and the secondary memory unit of a computer. (5%)

2. Draw flow-chart diagrams for the **while** statement and the **do/while** statement and explain the difference between them. (5%)

3. List the computer data hierarchy from bit to database. (5%)

4. What does this program segment do? (5%)
```cpp
int main ( )
{
 int   x = 6;
 int &y = x;

 cout<<"x="<<x<<endl<<"y="<<y<<endl;
 y = 7;
 cout<<"x="<<x<<endl<<"y="<<y<<endl;
 return 0;
}
```

5. What does this program segment do? (5%)
```cpp
float data;
 for (int a = 1; a <= 5; a++)
 {
  data = (a + 2)/a;
  cout << "(" << "a+2)" << "/" << "a";
  cout << "=" << data << endl;
 }
```

6. Show the results of running this program. (5%)
```cpp
#include <iostream>
using namespace std;
    unsigned long my_func( unsigned long );
int main()
{
 unsigned long result, number = 5;
 result = my_func(number);
 cout << "My function(" << number << ") = "<< result << endl;
 return 0;
}

unsigned long my_func( unsigned long n )
{
 if ( n == 0 || n == 1 )
    return n;
 else
    return my_func(n-1) + 3*my_func(n-2);
}
```

7. Find and correct the errors of the following code. (5%)
```cpp
int x = 7, y = 3;
   if ( x > 5)
      if ( y > 5)
         cout << "x and y are >5."<<endl;
      else
         cout << "x is <=5."<<endl;
```

注意：背面有試題

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8. Show the results of running this program. (10%)

```cpp
#include <iostream>
using namespace std;
void f1(void);
void f2(void);
int x = 9;

int main()
{
    int x = 3;
    cout << "Initially, x = " << x << endl;
      {
        int x = 7;
        cout << "Now, x = " << x << endl;
      }
    f1();
    f2();
    f1();
    f2();
    f1();
    f2();
    cout << "Finally, x = " <<x << endl;
    cout << "And here, x = " <<::x << endl;
    return 0;
}

void f1()
{
 int x = 5;
 x* = 2;
 cout << "During f1, x = " << x << endl;
}

void f2()
{
 static int x = 3;
 x* = 2;
 cout << "During f2, x = " << x <<endl;
}
```

9. Write a C/C++ function which can separate a five-digit number by *three spaces* for each of the two consecutive digits. For example, if the number inputted is 12345, the function output is
"1   2   3   4   5". (5%)

10. Write a C/C++ function which can find all the prime numbers between 1 and 300. (5%)

11. A right triangle having three integer sides is called a Pythagorean triple. These three sides (a,b,c) in such triangle must satisfy $c^2 = a^2 + b^2$. Please write a C/C++ program which can print out all the sets (a,b,c) with $c \leq 1000$. Note that side b must be equal or greater than side a for all the sets. (10%)

a	b	c
3	4	5
5	12	13
...	...	...

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12. What is the output by the following program? (5%)

```
int main()
{
char s1[] = "Merry Christmas";
char *sPtr2 = "Happy New Year";
cout << s1 << setw( 4 ) << sPtr2;
for ( int i = 0; ( s1[ i ] = sPtr2[ i ] ) != '\0'; i++ );
cout << endl << s1 << setw( 4 ) << sPtr2 << endl;
return 0;
} // end main
```

13. What is output by the following program segment? (5%)

```
int number = 39;
int *ptr = &number; // address of number is 0F12BF7C
cout << number << " " << *ptr <<" " << ptr;
```

14. Create a class called **Complex** for performing arithmetic with complex numbers, that is, addition, subtraction, multiplication, and division for complex numbers. (10%)

15. Create a function called **Gaussian** to generate a Gaussian sequence with standard deviation equal to 1.0 and having the appointed length (number) N. (15%)