C++程式設計

函數

函數

函數(Function): 一段程式碼，以給定的名稱呼叫。可節省撰寫相同程式碼的時間，簡化程式結構。

```
資料型態 函數名稱(參數1, 參數2, ...)
{
    敘述主體;
}
```

```
1  #include <iostream>
2  using namespace std;
3
4  int add(int a, int b)
5  {
6      int r;
7      r=a+b;
8      return r;
9  }
10
11 int main()
12 {
13     int x;
14     x = add(5,3);
15     cout << "The result is " << x;
16 }
```

```
The result is 8
```

函數

函數可被重複呼叫

```
The first result is 5
The second result is 5
The third result is 2
The fourth result is 6
```

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

int sub(int a, int b)
{
  int r;
  r=a-b;
  return r;
}

int main()
{
  int x=5, y=3, z;
  z = sub(7,2);
  cout << "The first result is " << z << endl;
  cout << "The second result is " << sub(7,2) << endl;
  cout << "The third result is " << sub(x,y) << endl;
  z= 4 + sub(x,y);
  cout << "The fourth result is " << z << endl;
}
```

函數

使用void代表無傳回值

```
1  #include <iostream>
2  using namespace std;
3
4  void star(void)
5  {
6    for(int i=1;i<=12;i++)
7      cout << "*";
8    cout << endl;
9  }
10
11 int main()
12 {
13   star();
14   cout << "Hello world!" << endl;
15   star();
16 }
```

```
************
Hello world!
************
```

函數

傳值呼叫(call by value)

```
1  #include <iostream>
2  using namespace std;
3
4  void dup(int a, int b, int c)
5  {
6     a*=2;
7     b*=2;
8     c*=2;
9  }
10
11 int main()
12 {
13    int x=1, y=3, z=5;
14    dup(x, y, z);
15    cout << "x=" << x << ", y=" << y << ", z=" << z;
16    return 0;
17 }
```

```
x=1, y=3, z=5
```

函數

傳參考呼叫(call by reference)

```
1  #include <iostream>
2  using namespace std;
3
4  void dup(int& a, int& b, int& c)
5  {
6    a*=2;
7    b*=2;
8    c*=2;
9  }
10
11 int main()
12 {
13   int x=1, y=3, z=5;
14   dup(x, y, z);
15   cout << "x=" << x << ", y=" << y << ", z=" << z;
16   return 0;
17 }
```

```
x=2, y=6, z=10
```

函數

函數需先宣告或定義才可被呼叫

```
Please, enter number (0 to exit): 11
It is odd.
Please, enter number (0 to exit): 25
It is odd.
Please, enter number (0 to exit): 66
It is even.
Please, enter number (0 to exit): 0
It is even.
```

```
1  #include <iostream>
2  using namespace std;
3
4  void odd(int x);
5  void even(int x);
6
7  int main()
8  {
9    int i;
10   do{
11     cout << "Please, enter number (0 to exit): ";
12     cin >> i;
13     odd(i);
14   }while(i!=0);
15   return 0;
16 }
17
18 void odd(int x)
19 {
20   if((x%2)!=0) cout << "It is odd.\n";
21   else even(x);
22 }
23
24 void even(int x)
25 {
26   if((x%2)==0) cout << "It is even.\n";
27   else odd(x);
28 }
```

函數

遞迴函數(recursive function)

- 呼叫自己的函數

```
1  #include <iostream>
2  using namespace std;
3
4  int fact(int);
5
6  int main()
7  {
8      int a;
9      do{
10         cout << "Input an integer:";
11         cin >> a;
12     }while(a<=0);
13     cout << "1*2*...*" << a << "=" << fact(a) << endl;
14 }
15
16 int fact(int a)
17 {
18     if(a>0)
19         return (a*fact(a-1));
20     else
21         return 1;
22 }
```

```
Input an integer:-1
Input an integer:5
1*2*...*5=120
```