

## 实验八 循环控制（2）

### 一、实验目的

- 1.熟悉用 while、do-while、和 for 语句实现循环的方法；
- 2.掌握在程序设计中用循环的方法实现一些常用算法；
- 3.进一步学习调试与修改程序。

### 三、实验内容

#### ➤·基本题

（一）完善程序（对每处填空分别作出必要的注释）

- 1、统计从键盘上输入的字符中的数字字符的个数,用换行符结束循环。

```
int n=0,c;  
c=_____;  
while_____  
{if _____ n++;  
  c=_____;  
}
```

```

1  #include <iostream>
2  #include <cstdio>
3  using namespace std;
4  int main()
5  {
6      int n = 0, c, cnt = 0;
7
8      c = getchar();
9      rewind(stdin);
10     while (c != 10)
11     {
12         if ((int)'0' <= c && (int)'9' >= c)
13             n++;
14         c = getchar();
15         rewind(stdin);
16         ++cnt;
17     }
18     cout << n << endl;
19     cout << "循环次数为 " << cnt << endl;
20 }
21

```

```

Meow! What should I do next? ... c learning 10:38
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebug
Launcher.exe' '--stdin=Microsoft-MIEngine-In-bqjgzs0c.4yf' '--stdout=Microsoft-MIEngine-Out-mm0wwvde.2ua' '--st
derr=Microsoft-MIEngine-Error-lak1pzbb.biq' '--pid=Microsoft-MIEngine-Pid-t4jh5i03.1qh' '--dbgExe=C:\Users\2856
7\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'
1
2
3
3
循环次数为 3
Meow! What should I do next? ... c learning 10:38
~ 

```

2、下列程序段的循环体的执行次数是三次。

a=10;b=0;

do {b+=2;a-=2+b;} while (a>=0);

```
PROBLEMS 2 TERMINAL OUTPUT PORTS SERIAL MONITOR DEBUG CONSOLE
Meow! What should I do next? ...
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebug
Launcher.exe' '--stdin=Microsoft-MIEngine-In-ddss8tvc.ogq' '--stdout=Microsoft-MIEngine-Out-frvlbtff.lju' '--st
derr=Microsoft-MIEngine-Error-bodyknbv.t4t' '--pid=Microsoft-MIEngine-Pid-0xqkfaf4.ci2' '--dbgExe=C:\Users\2856
7\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'
3
```

(二) 运行程序，输出结果

1. 写出以下两个程序的输出结果，注意循环的次数和循环体的位置。

(1) main ( )	(2) main
( )	
{int num=0;	int
num=0;	
while (num <=1)	while
(num++ <=1) ;	
{num++;	
printf ( “%d\n,num) ;	
printf ( “%d\n” ,	
num) ;	printf(“**%d\n”,num);
}	}
}	

程序一：

```
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebug
Launcher.exe' '--stdin=Microsoft-MIEngine-In-kfup1l2n.4vs' '--stdout=Microsoft-MIEngine-Out-xebk1lmo.4nj' '--st
derr=Microsoft-MIEngine-Error-vywagb3k.ccw' '--pid=Microsoft-MIEngine-Pid-d0xr1yu2.eby' '--dbgExe=C:\Users\2856
7\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'
1
2
```

程序二：

```
Meow! What should I do next? ...
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebug
Launcher.exe' '--stdin=Microsoft-MIEngine-In-bbbzixhr.0pz' '--stdout=Microsoft-MIEngine-Out-pu3redhm.hix' '--st
derr=Microsoft-MIEngine-Error-i13rgtz3.agp' '--pid=Microsoft-MIEngine-Pid-43aw0kva.ibs' '--dbgExe=C:\Users\2856
7\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'
*1
*2
**3
```

2、# include <stdio.h>

```
main()
{int y=10;
do {y--;}while(--y);
printf("%d\n",y--);
}
```

输出为 0

Do-While 结束后 y = 0

Print 时，先返回 0，再执行 y = y-1

```
Meow! What should I do next? ...
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebug
Launcher.exe' '--stdin=Microsoft-MIEngine-In-js1xh4sw.3k4' '--stdout=Microsoft-MIEngine-Out-bo5vbq12.cnn' '--st
derr=Microsoft-MIEngine-Error-bd14vuxq.xwh' '--pid=Microsoft-MIEngine-Pid-lh1a5lkn.zou' '--dbgExe=C:\Users\2856
7\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'
0
```

3、#include <stdio.h>

```
main()
{int i,j,x=0;
```

```

for (i=0;i<2;i++)
{
    x++;
    for (j=0;j<=3;j++)
    {
        if (j%2) continue;
        x++;
    }
    x++;
}
printf("x=%d\n",x);
}

```

输出 x = 8

第一个 for 执行两次

第二个 for 每次执行三次 在 j = 0, 2 时候条件为真

x 共加 8



```

Meow! What should I do next? ... c learning 10:53
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebug
Launcher.exe' '--stdin=Microsoft-MIEngine-In-0g0kn2bl.uif' '--stdout=Microsoft-MIEngine-Out-kfrfhrtt.1m5' '--st
derr=Microsoft-MIEngine-Error-rbqe1g3u.stc' '--pid=Microsoft-MIEngine-Pid-rtenoil2.0vl' '--dbgExe=C:\Users\2856
7\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'
x=8

```

```

4、main ()
{
    int i=1,s=3;
    do
    {
        s+=i++;
        if (s%7==0) continue;
        else ++i;
    }while (s<15);
    printf("%d",i);}

```

输出 8



```

Meow! What should I do next? ... c learning 10:57
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebug
Launcher.exe' '--stdin=Microsoft-MIEngine-In-vacogu3d.tqp' '--stdout=Microsoft-MIEngine-Out-elljduiu.knx' '--st
derr=Microsoft-MIEngine-Error-hxcdcd2vb.s1e' '--pid=Microsoft-MIEngine-Pid-pkbrhrs3.4tz' '--dbgExe=C:\Users\2856
7\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'
8

```

(三) 编程

1、求有多少种方法可将 1.0 元人民币兑换成 1 分，2 分，5 分，1 角，2 角，5 角。

```

1  #include <iostream>
2  int main()
3  {
4      //求有多少种方法可将1.0元人民币兑换成1分, 2分, 5分, 1角, 2角, 5角。
5      int count = 0, sum = 0, cnt = 0;
6      int ii, jj, kk, ll, mm;
7      for (int i = 0; i <= 2; i++)
8      {
9          ii = (100 - i * 50) / 20;
10         for (int j = 0; j <= ii; j++)
11         {
12             jj = (100 - i * 50 - j * 20) / 10;
13             for (int k = 0; k <= jj; k++)
14             {
15                 kk = (100 - i * 50 - j * 20 - k * 10) / 5;
16                 for (int l = 0; l <= kk; l++)
17                 {
18                     ll = (100 - i * 50 - j * 20 - k * 10 - l * 5) / 2;
19                     for (int m = 0; m <= ll; m++)
20                     {
21                         ++cnt;
22                         count++;
23                     }
24                 }
25             }
26         }
27     }
28     std::cout << count << std::endl;
29     std::cout << cnt << std::endl;
30 }

```

```

Meow! What should I do next? ... c learning 16:54
~ & 'c:\Users\28567\.vscode\extensions\ms-vscode.cpptools-1.19.9-win32-x64\debugAdapters\bin\WindowsDebugLauncher.exe' '--stdi
n=Microsoft-MIEngine-In-11c3uive.0r2' '--stdout=Microsoft-MIEngine-Out-2oixzwsj4l' '--stderr=Microsoft-MIEngine-Error-dpp4xynp.uz2
' '--pid=Microsoft-MIEngine-Pid-hd1axn2z.rms' '--dbgExe=C:\Users\28567\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'
4562
4562

```

上面输出为方法数

下面输出为循环次数

2. 打印下列图案:

```

    *   *
  *** **
*****
  *** **
    *   *

```

要求程序能打印任意层次的图案 ,如上图 n=5

```

1  #include <iostream>
2  #include <cmath>
3  #include <iomanip>
4  using namespace std;
5  int main()
6  {
7      int n = 11;
8      for (int i = 0; i < n; ++i)
9      {
10         if (i < n / 2)
11         {
12             for (int j = 0; j < n / 2 - i; ++j)
13             {
14                 cout << " ";
15             }
16             for (int j = 0; j < 2 * i + 1; ++j)
17             {
18                 cout << "*";
19             }
20             for (int j = 0; j < n - 2 * (i + 1); ++j)
21             {
22                 cout << " ";
23             }
24             for (int j = 0; j < 2 * i + 1; ++j)
25             {
26                 cout << "*";
27             }
28             cout << endl;
29         }
30         else if (i > n / 2)
31         {
32             for (int j = 0; j < abs(n / 2 - i); ++j)
33             {
34                 cout << " ";
35             }
36             for (int j = 0; j < 2 * (n - i) - 1; ++j)
37             {
38                 cout << "*";
39             }
40             for (int j = 0; j < n - 2 * (n - i); ++j)
41             {
42                 cout << " ";
43             }
44             for (int j = 0; j < 2 * (n - i) - 1; ++j)
45             {
46                 cout << "*";
47             }
48             cout << endl;
49         }
50         else
51         {
52             for (int j = 0; j < 2 * n - 1; ++j)
53             {
54                 cout << "*";
55             }
56             cout << endl;
57         }
58     }
59     return 0;
60 }

```





```
1  #include <iostream>
2  #include <string>
3  using namespace std;
4  int main()
5  {
6      void number_print(int n, int max_num);
7      int n = 0;
8      cin >> n;
9      int max_lenth = to_string(n).length();
10     for (int i = 1; i <= n; ++i)
11     {
12         for (int j = 0; j < n - i; ++j)
13         {
14             for (int k = 0; k < max_lenth + 1; ++k)
15                 cout << " ";
16         }
17         for (int j = 1; j <= i; ++j)
18         {
19             number_print(j, n);
20         }
21         for (int j = i - 1; j > 0; --j)
22         {
23             number_print(j, n);
24         }
25         cout << endl;
26     }
27 }
28 void number_print(int n, int max_num)
29 {
30     int max_lenth = to_string(max_num).length();
31     int num_lenth = to_string(n).length();
32     for (int i = 0; i < max_lenth - num_lenth + 1; ++i)
33     {
34         cout << " ";
35     }
36     cout << n;
37 }
```



```
vsq1.ngg' '--pid=Microsoft-MIEngine-Pid-mm43ejp.fm0' '--dbgExe=C:\Users\28567\Documents\mingw64\bin\gdb.exe' '--interpreter=mi'
10
      1
    1 2 1
  1 2 3 2 1
1 2 3 4 3 2 1
  1 2 3 4 5 4 3 2 1
    1 2 3 4 5 6 5 4 3 2 1
      1 2 3 4 5 6 7 6 5 4 3 2 1
        1 2 3 4 5 6 7 8 7 6 5 4 3 2 1
          1 2 3 4 5 6 7 8 9 8 7 6 5 4 3 2 1
            1 2 3 4 5 6 7 8 9 10 9 8 7 6 5 4 3 2 1
Meow! What should I do next? ...
c learning 21:26
```

## 四、思考与讨论

1. 小结三种形式的循环使用的区别；  
While 和 for 循环是可以相互替代/转换的  
而 Do-While 一定会执行一次循环体内的语句
2. 小结循环嵌套的规定和应用。  
循环嵌套需要使用不同变量控制

## 五、课后作业

撰写实验报告。

## 六、实验机时

2 机时。