# 实现细节

到目前为止游戏基本能玩了，可是仍然有很多不方便的细节问题需要解决：

1. 游戏一局结束能否继续
2. 解题的时限问题
3. 根据玩家的战绩自动升/降级问题
4. 出题难度与游戏级别对应的问题

## 选择游戏是否继续

增加

```
char repeat='y';     //游戏是否继续
```

如图

```
 8  using namespace std;
 9
10  char opt='+';          //运算符
11  char disp='h';         //显示算式方式
12  char repeat='y';       //游戏是否继续
13
```

修改main.cpp中的main函数增加游戏循环处理

```cpp
27   int main(int argc, char** argv) {
28
29       if(!params(argc,argv,num,disp)) return 0;
30       settings(level,opt,hard);
31       srand((unsigned)time(NULL));     //设定随机数生成方式
32
33       while(repeat=='y'){
34           cout << "Level=" << level << ",Operator=" << opt << ",Hard=" << hard ;
35           cout << ",Disaplay=" << disp << ",Number=" << num << endl;
36
37           correct=0;
38           wrong=0;
39           overtime=0;
40           for(int i=0;i<num;i++){          //让计算机出num道题
41               x = (long long)rand();
42               y = (long long)rand();
43
44               problem(disp,x,opt,y);
45               cin >> ans;
46
47               switch(opt){
48                   case '+':
49                       result = x + y;
50                       break;
51                   case '-':
52                       result = x - y;
53                       break;
54               }
55
56               if(ans==result)
57                   cout << "Right!" << endl;
58               else
59                   cout << "Error!" << endl;
60           }
61           score(correct,wrong,overtime,num);
62
63           cout << "\nContinue this game? ([y]/n)";
64           getchar();
65           repeat = getchar();
66           if(repeat=='y' || repeat=='Y' || repeat=='\n')
67               repeat = 'y';
68           else
69               repeat = 'n';
70           cout << endl;
71       }
```

按F12重新构造全部。

进入命令终端，带--disp v --numb 3运行游戏程序：

```
F:\a.steam\dreamx\wedo\game\arith>arith --disp v --numb 3
Please select level([1]-18):
Please select operator([+],-):
Please select Hard([1]-60):
Level=1,Operator=+,Hard=1,Disaplay=v,Number=3
                  13
+             10879
-----------------------
```

```
=3
Error!
                        748
+                      3916
------------------------
=3
Error!
                       4705
+                      5360
------------------------
=3
Error!


right    wrong    overtime
---------------------------------
0        0        0

score=0 bad

Continue this game？([y]/n)
```

# 增加计时功能

增加

```
clock_t start;        //答题开始时间
clock_t finish;       //答题结束时间
```

如图：

```cpp
     #include <cstring>
     #include "settings.h"
     #include "params.h"
     #include "display.h"
     using namespace std;

     char opt='+';          //运算符
     char disp='h';         //显示算式方式
     char repeat='y';       //游戏是否继续

     int level=1;           //关卡数
     int hard=1;            //难度值
     int num=10;            //出题数

     long long x;           //操作数1，被加数或被减数
     long long y;           //操作数2，加数或减数
     long long ans;         //由你提供的回答
     long long result;      //正确答案

     double correct=0;      //做对题数
     double wrong=0;        //做错题数
     double overtime=0;     //超时题数

     clock_t start;         //答题开始时间
     clock_t finish;        //答题结束时间

```

修改main.cpp中的main函数

```
34        srand((unsigned)time(NULL));      //设定随机数生成方式
35
36 ┌   while(repeat=='y'){
37          cout << "Level=" << level << ",Operator=" << opt << ",Hard=" << hard ;
38          cout << ",Disaplay=" << disp << ",Number=" << num << endl;
39
40          correct=0;
41          wrong=0;
42          overtime=0;
43 ┌        for(int i=0;i<num;i++){              //让计算机出num道题
44              x = (long long)rand();
45              y = (long long)rand();
46
47              problem(disp,x,opt,y);
48
49              start = clock();
50              cin >> ans;
51              finish = clock();
52
53 ┌            switch(opt){
54                  case '+':
55                      result = x + y;
56                      break;
57                  case '-':
58                      result = x - y;
59                      break;
60              }
61
62              double usetime = (double)(finish-start)/CLOCKS_PER_SEC;
63 ┌            if(ans==result){
64                  if(usetime>(61-hard))
65                      overtime++;
66                  else
67                      correct ++;
68                  printf("Time used = %.2f\t=>Right.\n\n",usetime);
69              }else{
70                  wrong ++;
71                  printf("Time used = %.2f\t=>Wrong.\t(%lld)\n\n",usetime,result);
72              }
73          }
74          score(correct,wrong,overtime,num);
```

按F12重新构造全部。

进入命令终端，带--disp v --numb 3运行游戏程序：

```
F:\a.steam\dreamx\wedo\game\arith>arith --disp v --numb 3
Please select level([1]-18):
Please select operator([+],-):
Please select Hard([1]-60):
Level=1,Operator=+,Hard=1,Disaplay=v,Number=3
                  1551
+                27106
------------------------
=4
Time used = 1.33        =>Wrong.        (28657)


                 26165
+                    9
------------------------
=4
Time used = 1.98        =>Wrong.        (26174)
```

```
                    13206
+                   19841
------------------------
=4
Time used = 0.86      =>Wrong.       (33047)




right    wrong   overtime
---------------------------------
0        3       0

score=0 bad

Continue this game？([y]/n)
```

# 解决游戏晋级/降级问题

在游戏重复循环结尾处增加如下代码

```c
    if(overtime/num>0.5){
        hard = hard -1;
        if(hard<1) hard = 1;
    }else if(correct/num<0.5){
        num = num + 1;
    }else if(correct/num>=0.9){
        level = level + 1;
    }else{
        hard = hard + 1;
    }

}

return 0;
```

按F12重新构造全部。

进入命令终端，带--disp v --numb 3运行游戏程序：

```
F:\a.steam\dreamx\wedo\game\arith>arith --disp v --numb 3
Please select level([1]-18):
Please select operator([+],-):
Please select Hard([1]-60):
Level=1,Operator=+,Hard=1,Disaplay=v,Number=3
                    2547
+                   28570
-----------------------
=4
Time used = 1.57      =>Wrong.       (31117)

                    2481
```

```
+                    32056
------------------------
=4
Time used = 1.12        =>Wrong.         (34537)


                    13423
+                    5078
------------------------
=4
Time used = 1.15        =>Wrong.         (18501)




right    wrong    overtime
---------------------------------
0        3        0

score=0 bad

Continue this game？([y]/n)
```

# 解决游戏级别的精准性问题

修改出题方式提高游戏级别的精准性

```
36  while(repeat=='y'){
37      cout << "Level=" << level << ",Operator=" << opt << ",Hard=" << hard ;
38      cout << ",Disaplay=" << disp << ",Number=" << num << endl;
39
40      long long mod = 1;
41      for(int i=0;i<level;i++)
42          mod = mod * 10;
43
44      correct=0;
45      wrong=0;
46      overtime=0;
47      for(int i=0;i<num;i++){
48          x = (long long)rand();
49          while(x<mod){
50              int r = rand();
51              x = x * 10 + r;
52          }
53          x = x % mod;
54
55          y = (long long)rand();
56          while(y<mod){
57              int r = rand();
58              y = y * 10 + r;
59          }
60          y = y % mod;
61
62          problem(disp,x,opt,y);
```

按F12重新构造全部。

进入命令终端，带--disp v --numb 3运行游戏程序：

```
F:\a.steam\dreamx\wedo\game\arith>arith --disp v --numb 3
Please select level([1]-18):
Please select operator([+],-):
Please select Hard([1]-60):
Level=1,Operator=+,Hard=1,Disaplay=v,Number=3
                        3
+                       1
-------------------------
=4
Time used = 2.92        =>Right.


                        0
+                       1
-------------------------
=1
Time used = 2.16        =>Right.


                        6
+                       5
-------------------------
=11
Time used = 1.48        =>Right.



right    wrong   overtime
----------------------------------
3        0       0

score=100        king

Continue this game? ([y]/n)
```