6.栈和递归

1、栈

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

int main()
{
    int n;
    cin >> n;
    vector<int> a(n);
    for (int i = 0; i < n; i++)
    {
        cin >> a[i];
    }
    stack<int> s;
    int cur = 1;
    bool f = 1;
    for (int i = 0; i < n; i++)
    {
        while((s.empty() || s.top() != a[i]) && cur <= n)
        {
            s.push(cur);
            cur++;
        }
        if(s.empty() || s.top()!=a[i])
        {
            f = 0;
            break;
        }
        else
        {
            s.pop();
        }
    }
    if(f)
    {
        cout << "legal" <<endl;
    }
    else
    {
```

```
41        cout << "illegal" <<endl;
42    }
43    return 0;
44 }
```

2、汉诺塔1

```cpp
1  #include <iostream>
2  #include <vector>
3  #include <stack>
4  using namespace std;
5
6  stack<int> S[3];
7  void move(int x,int y)
8  {
9      int temp = S[x].top();
10     S[x].pop();
11     S[y].push(temp);
12     cout << x << "-->" << y <<endl;
13 }
14 void hanoi(int A, int B,int C, int n)
15 {
16     if(n==1){
17         move(A,C);
18         return;
19     }
20     hanoi(A,C,B,n-1);
21     move(A,C);
22     hanoi(B,A,C,n-1);
23 }
24 int main()
25 {
26     int n;
27     cin >> n;
28     for (int i = n; i >= 1; i--)
29     {
30         S[0].push(i);
31     }
32     hanoi(0,1,2,n);
33     while(!S[2].empty())
34     {
35         cout << S[2].top() <<" ";
36         S[2].pop();
37     }
38     return 0;
39 }
```

汉诺塔2

```
1
```

3、吃桃

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

int n;
int f(int x)
{
    if (x==n)
        return 1;
    else
        return (f(x+1) + 1) * 2;
}
int main()
{
    cin >> n;
    printf("%d",f(1));
    return 0;
}
```

4、快速幂

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

long long f(long long x, long long y,long long p)
{
    if (y == 0)
        return 1%p;
    else if (y % 2 == 0)
    {
        long long temp = f(x, y/2, p);
        return temp * temp %p;
    }
    else
    {
        long long temp = f(x, y/2, p);
        return temp * temp % p * x % p;
    }

}

int main()
{
    int t;
    long long x,y,p;
    scanf("%d",&t);
    while(t--)
    {
        scanf("%lld%lld%lld",&x,&y,&p);
```

```
29          printf("%lld\n",f(x,y,p));
30      }
31      return 0;
32  }
```

5、弹簧板?

```
1   #include <iostream>
2   #include <algorithm>
3   using namespace std;
4   int a[205],b[205];
5   int ans[205];
6   bool vis[205];
7   int f (int x)
8   {
9       if(x >= n)
10          return 0;
11      if(vis[x])
12          return ans[x];
13      vis[x] = true;
14      return ans[x] = min(f(x+a[x]),f(x+b[x]))+1;
15  }
16  int main()
17  {
18      int n;
19      scanf("%d",&n);
20      for(int i = 0; i <n; i++)
21          scanf("%d",&a[i]);
22      for (int i = 0; i < n; i++)
23          scanf("%d",&b[i]);
24      printf("%d\n",f(0)+1);
25      return 0;
26  }
```

6、最大公约数

```
1   #include <iostream>
2   using namespace std;
3
4   int gcd(int x, int y)
5   {
6       if(y == 0)
7           return x;
8       else
9       {
10          return gcd(y,x%y);
11      }
12  }
13  int main()
14  {
15      int x,y;
```

```
16      scanf("%d%d",&x,&y);
17      printf("%d",gcd(x,y));
18      return 0;
19  }
```

7、括号匹配?

```
1   #include <iostream>
2   #include <cstring>
3   #include <stack>
4   using namespace std;
5   char s[50005];
6   stack<int> st;
7   int ans[50005];
8   int main()
9   {
10      int len;
11      bool f = true;
12      scanf("%s",s);
13      len = strlen(s);
14      for(int i = 0; i < len; i++ )
15      {
16          if (s[i] == '(')
17          {
18              st.push(i+1);
19          }
20          else
21          {
22              if(!s.empty())
23              {
24                  ans[i+1] = st.top();
25                  st.pop();
26              }
27              else
28              {
29                  f = false;
30                  break;
31              }
32          }
33      }
34      if (!st.empty())
35      {
36          f = false;
37      }
38      if (!f)
39          printf("No\n");
40      else
41      {
42          printf("Yes\n");
43          for(int i = 1; i <= len; i ++)
44          {
```

```c
            if (ans[i])
            {
                printf("%d %d\n",ans[i],i);
            }
        }
    }

    return 0;
}
```