

Programming 3-8: Connectivity

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1 Problem 3-8-A: 最靓的崽

1.1 代码样例

```
1 #include<bits/stdc++.h>
2 using namespace std;
3 int n,m,x,t,dfn[10010],low[10010],b[10010],h[10010],
4 c[10010],sum,ans,tot,q[10010],y,tag;
5 bool v[10010];
6 struct edge
7 {
8     int x,next;
9 }a[50010];
10 void tarjan(int x)
11 {
12     int y;
13     dfn[x]=low[x]=++t;
14     q[++tot]=x;
15     v[x]=true;
16     for(int i=h[x];i!=0;i=a[i].next)
17     {
18         y=a[i].x;
19         if(dfn[y]==0)
20         {
21             tarjan(y);
22             low[x]=min(low[x],low[y]);
23         }
24         else if(v[y]==true) low[x]=min(low[x],dfn[y]);
25     }
26     if(dfn[x]==low[x])
27     {
28         tag++;
29         while(q[tot]!=x)
30         {
31             b[q[tot]]=tag;
32             v[q[tot]]=true;
33             tot--;
34         }
35         b[q[tot]]=tag;
36         v[q[tot]]=true;
37         tot--;
38     }
```

```

39 }
40 int main()
41 {
42     scanf("%d%d",&n,&m);
43     memset(h,0,sizeof(h));
44     memset(dfn,0,sizeof(dfn));
45     memset(low,0,sizeof(low));
46     memset(v,false,sizeof(v));
47     memset(c,0,sizeof(c));
48     sum=0;
49     for(int i=1;i<=m;i++)
50     {
51         sum++;
52         scanf("%d%d",&x,&y);
53         a[sum].x=y;a[sum].next=h[x];h[x]=sum;
54     }
55
56     t=0;tot=0;tag=0;
57     for(int i=1;i<=n;i++)
58         if(dfn[i]==0) tarjan(i);
59
60     for(int i=1;i<=n;i++)
61         for(int j=h[i];j!=0;j=a[j].next)
62             if(b[i]!=b[a[j].x]) c[b[i]]++;
63
64     sum=0;ans=0;
65     for(int i=1;i<=tag;i++)
66         if(c[i]==0)
67             {sum++;ans=i; }
68     if(sum!=1) printf("0\n");
69     else
70     {
71         sum=0;
72         for(int i=1;i<=n;i++)
73             if(b[i]==ans) sum++;
74         printf("%d\n",sum);
75     }
76     return 0;
77 }
78 /*****
79 Problem: 1563
80 User: 171860017
81 Language: C++
82 Result: 正确
83 Time:24 ms
84 Memory:2368 kb
85 *****/

```

Listing 1: A by 171860017

2 Problem 3-8-B: 网络连接

2.1 代码样例

```

1  #include <stdio>
2  #include <cstring>
3  #include <iostream>
4  #include <algorithm>
5  #define N 1005
6  using namespace std;
7  int map[N][N];
8  bool exist[N];
9  int dfn[N],low[N],cnt;
10 int stk[N],top;
11 int d[N];
12 void init()
13 {
14     memset(d,0,sizeof(d));
15     memset(dfn,0,sizeof(dfn));
16     memset(map,0,sizeof(map));
17     memset(exist,0,sizeof(exist));
18     cnt=top=0;
19 }
20 void tarjan(int x,int p)
21 {
22     int v,temp;
23     dfn[x]=low[x]=++cnt,stk[++top]=x;
24     for(v=1;v<=1000;v++)if(map[x][v]&&v!=p)
25     {
26         if(!dfn[v])
27         {
28             tarjan(v,x);
29             low[x]=min(low[x],low[v]);
30             if(dfn[x]<=low[v])
31             {
32                 do{
33                     temp=stk[top--];
34                     d[temp]++;
35                 }while(temp!=x);top++;
36             }
37         }
38         else low[x]=min(low[x],dfn[v]);
39     }
40     return ;
41 }
42
43 int main()
44 {
45     int i,T=0;
46     int a,b;
47     while(scanf("%d",&a),a)
48     {
49         init();
50         int flag=1;
51         T++;

```

```
52     printf("Network #%d\n",T);
53
54     do{
55         scanf("%d",&b);
56         map[a][b]=map[b][a]=1;
57         exist[a]=exist[b]=true;
58     }while(scanf("%d",&a),a);
59     scanf("%d",&b);
60     for(i=1;i<=1000;i++)if(exist[i]&&!dfn[i])tarjan(i,0);
61     for(i=1;i<=1000;i++)if(d[i]>=2)
62         printf("SPF node %d leaves %d subnets\n",i,d[i]),flag=0;
63     if(flag)puts("No SPF nodes");
64     // puts("");
65 }
66 return 0;
67 }
68
69 /*****
70 Problem: 1564
71 User: 171860609
72 Language: C++
73 Result: 正确
74 Time:84 ms
75 Memory:5512 kb
76 *****/
```

Listing 2: B by 171860609

3 Problem 3-8-C: 杰哥的噩梦

3.1 代码样例

```

1  #include <stdio.h>
2  #include <cstring>
3  #define N 1006
4  #define M 50005
5  int dfn[N],low[N],adj[N][N],count,vnum[N],m,n,u[N],v[N],fa[N],bridge[N][N];
6  bool vis[N],flag[N][N],cut[N];
7  int min(int a,int b){
8      if(a>b) return b;
9      return a;
10 }
11 void dfs(int node){
12     dfn[node]=count;low[node]=count;
13     vis[node]=true;
14     count++;
15     int i=1;
16     while(adj[node][i]!=-1){
17         int temp=adj[node][i];
18         if(!vis[temp]){
19             if(node==1&&i>=2) cut[node]=true;
20             fa[temp]=node;
21             dfs(temp);
22             low[node]=min(low[node],low[temp]);
23             if(low[temp]>=dfn[node]&&node!=1) cut[node]=true;
24             if(low[temp]>dfn[node]) bridge[temp][node]=bridge[node][temp]=true;
25         }
26         else if(temp!=fa[node]){
27             low[node]=min(low[node],dfn[temp]);
28         }
29         i++;
30     }
31 }
32
33 int main(){
34     int a,b;
35     memset(dfn,0,sizeof(dfn));
36     memset(low,0,sizeof(low));
37     memset(adj,-1,sizeof(adj));
38     memset(vis,true,sizeof(vis));
39     memset(vnum,0,sizeof(vnum));
40     memset(cut,false,sizeof(cut));
41     memset(flag,false,sizeof(flag));
42     memset(bridge,false,sizeof(bridge));
43     count=1;
44     scanf("%d%d",&n,&m);
45     for(int i=1;i<=m;i++){
46         scanf("%d%d",&a,&b);
47         if(flag[a][b]) continue;
48         flag[a][b]=flag[b][a]=true;
49         vis[a]=vis[b]=false;
50         vnum[a]++;vnum[b]++;
51         adj[a][vnum[a]]=b;adj[b][vnum[b]]=a;
52     }

```

```
53     dfs(1);
54     bool fla=false;
55     for(int i=1;i<=n;i++){
56         if(cut[i]){
57             printf("%d ",i);
58             fla=true;
59         }
60     }
61     if(!fla) printf("Null\n");
62     else printf("\n");
63     for(int i=1;i<=n-1;i++){
64         for(int j=i+1;j<=n;j++){
65             if(bridge[i][j]) printf("%d %d\n",i,j);
66         }
67     }
68 }
69
70
71
72
73 /*****
74     Problem: 1565
75     User: 171860538
76     Language: C++
77     Result: 正确
78     Time:12 ms
79     Memory:9880 kb
80 *****/
```

Listing 3: C by 171860538

4 Problem 3-8-D: 临时英雄执照考试

4.1 代码样例

```
1 #include<stdio.h>
2 int main(){
3     int m,n,i,u,v,num = 0,a[5001] = {0};
4     scanf("%d %d",&n,&m);
5     for(i = 0;i<m;i++){
6         scanf("%d %d",&u,&v);
7         a[u]++,a[v]++;
8     }
9     for(i = 1;i<=n;i++){
10         if (a[i]==1) num++;
11     }
12     printf("%d\n", (num+1)/2);
13 }
14 /*****
15     Problem: 1566
16     User: 171240525
17     Language: C++
18     Result: 正确
19     Time:4 ms
20     Memory:956 kb
21 *****/
```

Listing 4: D by 171240525