

```

1 #include "../bits/stdc++.h"
2 // 関節点 (= 取り除くと連結成分が増加する頂点) 列挙
3 // 根の場合, 次数が2以上なら関節点
4 // otherwise, 橋列挙での low > order を low >= order にすればよい
5 // verified: http://judge.u-aizu.ac.jp/onlinejudge/review.jsp?rid=3382055
6 class ArticulationPoint
7 {
8     using Graph = std::vector<std::vector<int>>>;
9     using P = std::pair<int, int>;
10    std::vector<int> order;
11    int next = 0;
12    Graph G;
13    std::vector<int> ps;
14
15    void add(int v)
16    {
17        ps.push_back(v);
18    }
19    int dfs(int cur, int pre)
20    {
21        int res = order[cur] = next++;
22        bool isArticulation = false;
23        int d = 0;
24        for (const auto &to : G[cur])
25        {
26            if (to == pre)
27                continue;
28            if (order[to] >= 0)
29                res = std::min(res, order[to]);
30            else
31            {
32                int low = dfs(to, cur);
33                if (pre >= 0 && low >= order[cur])
34                    isArticulation = true;
35                res = std::min(res, low);
36                d++;
37            }
38        }
39        if (pre < 0 && d >= 2)
40            isArticulation = true;
41        if (isArticulation)
42            add(cur);
43        return res;
44    }
45
46 public:
47     ArticulationPoint(int _v) : G(_v, std::vector<int>()), order(_v, -1) {}
48     void addEdge(int s, int t)
49     {
50         G[s].push_back(t);
51     }
52     std::vector<int> points()
53     {
54         dfs(0, -1);
55         sort(ps.begin(), ps.end());
56         return ps;
57     }
58 };
59

```