#include <cstdio>

#include <algorithm>

using namespace std;

int n, m;

long long s1, s2, s3, s;

int dep[500010], num[500010];

struct P

{

int i;

char c;

long long x, y;

} d[100010], st[500010];

bool operator < (P a, P b)

{

return a.x < b.x;

}

long long area(P a, P b, P c)

{

long long ret = a.x\*b.y+b.x\*c.y+c.x\*a.y-a.y\*b.x-b.y\*c.x-c.y\*a.x;

if (ret < 0)

return -ret;

return ret;

}

void solve(int a, int b, int c, int depth)

{

int cc = -1, i;

s = area(d[a], d[b], d[c]);

for (i = m-1; dep[i]+1 == depth && i >= 0; i--)

{

s1 = area(d[a], d[b], st[i]);

s2 = area(d[b], d[c], st[i]);

s3 = area(d[c], d[a], st[i]);

if (s1 && s2 && s3 && s == s1+s2+s3)

{

st[m] = st[i];

dep[m] = depth;

num[m] = num[i];

if (st[i].c == d[c].c)

cc = num[m];

m++;

}

}

if (cc != -1)

{

printf("%d %d %c\n", d[c].i, d[cc].i, d[c].c);

solve(a, b, cc, depth+1);

solve(c, cc, a, depth+1);

solve(c, cc, b, depth+1);

while (dep[m-1] == depth)

m--;

return;

}

while (dep[m-1] == depth)

{

m--;

printf("%d %d %c\n", d[a].i, st[m].i, d[a].c);

}

}

int main()

{

freopen("input.txt", "r", stdin);

freopen("output.txt", "w", stdout);

int a, b, c, i;

scanf("%d", &n);

for (i = 0; i < n; i++)

{

scanf("%lld%lld", &d[i].x, &d[i].y);

d[i].c = 'g';

d[i].i = i+1;

}

scanf("%d", &m);

for (i = 0; i < m; i++)

{

scanf("%lld%lld", &d[n].x, &d[n].y);

d[n].c = 'r';

d[n++].i = i+1;

}

m = n;

for (i = 0; i < n; i++)

{

st[i] = d[i];

dep[i] = 0;

num[i] = i;

}

for (i = 0; i < n; i++)

{

if (d[i].x == 0 && d[i].y == 0)

a = i;

if (d[i].x > 0 && d[i].y == 0)

b = i;

if (d[i].x == 0 && d[i].y > 0)

c = i;

}

printf("%d %d r\n", d[a].i, d[b].i);

solve(a, b, c, 1);

for (i = 0; i < n && d[i].x != d[c].y || d[i].y != d[c].y; i++);

printf("%d %d g\n", d[c].i, d[i].i);

solve(c, i, b, 1);

return 0;

}