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// 11 grade
#include <fstream>
#include <cstring>
#include <bits/stdc++.h>
using namespace std;
ifstream fin("veitch.in");
ofstream fout("veitch.out");
struct pct
{
    char s[10];
    int x;
}mat[5][5];
int sf[5][5];
int main()
{
    int i,j;
    strcpy(mat[1][1].s,"ab~c~d");
    strcpy(mat[1][2].s,"abc~d");
    strcpy(mat[1][3].s,"~abc~d");
    strcpy(mat[1][4].s,"~ab~c~d");
    strcpy(mat[2][1].s,"ab~cd");
    strcpy(mat[2][2].s,"abcd");
    strcpy(mat[2][3].s,"~abcd");
    strcpy(mat[2][4].s,"~ab~cd");
    strcpy(mat[3][1].s,"a~b~cd");
    strcpy(mat[3][2].s,"a~bcd");
    strcpy(mat[3][3].s,"~a~bcd");
    strcpy(mat[3][4].s,"~a~b~cd");
    strcpy(mat[4][1].s,"a~b~c~d");
    strcpy(mat[4][2].s,"a~bc~d");

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strcpy(mat[4][3].s,"~a~bc~d");
strcpy(mat[4][4].s,"~a~b~c~d");
char exp[1001];
char * p;
for(int o=1;o<=5;o++)
{
fin>>exp;
p=strtok(exp," ");
int cnt=1;
int h;
while(p!=NULL)
{
h=0;
while(h<strlen(p))
{
if(p[h]=='~')
{
if(p[h+1]=='A')
{
for(i=1;i<=4;i++)
{
for(j=1;j<=4;j++)
{
if(strstr(mat[i][j].s,"~a") && mat[i][j].x!=-cnt)
mat[i][j].x=cnt;
else
{
if(mat[i][j].x==cnt || !mat[i][j].x)
mat[i][j].x=-cnt;
}
}
}
}
}
}
}
}

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}
if(p[h+1]=='B')
{
for(i=1;i<=4;i++)
{
for(j=1;j<=4;j++)
{
if(strstr(mat[i][j].s,"~b") && mat[i][j].x!=-cnt)
mat[i][j].x=cnt;
else
{
if(mat[i][j].x==cnt || !mat[i][j].x)
mat[i][j].x=-cnt;
}
}
}
}
if(p[h+1]=='C')
{
for(i=1;i<=4;i++)
{
for(j=1;j<=4;j++)
{
if(strstr(mat[i][j].s,"~c") && mat[i][j].x!=-cnt)
mat[i][j].x=cnt;
else
{
if(mat[i][j].x==cnt || !mat[i][j].x)
mat[i][j].x=-cnt;
}
}
}
}
}

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}
if(p[h+1]=='D')
{
for(i=1;i<=4;i++)
{
for(j=1;j<=4;j++)
{
if(strstr(mat[i][j].s,"~d") && mat[i][j].x!=-cnt)
mat[i][j].x=cnt;
else
{
if(mat[i][j].x==cnt || !mat[i][j].x)
mat[i][j].x=-cnt;
}
}
}
}
h+=2;
}
else
{
if(p[h]=='A')
{
for(i=1;i<=4;i++)
{
for(j=1;j<=4;j++)
{
if(!strstr(mat[i][j].s,"~a") && mat[i][j].x!=-cnt)
mat[i][j].x=cnt;
else
{
if(mat[i][j].x==cnt || !mat[i][j].x)

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        mat[i][j].x=-cnt;
    }
}
}
}
if(p[h]=='B')
{
    for(i=1;i<=4;i++)
    {
        for(j=1;j<=4;j++)
        {
            if(!strstr(mat[i][j].s,"~b") && mat[i][j].x!=-cnt)
                mat[i][j].x=cnt;
            else
            {
                if(mat[i][j].x==cnt || !mat[i][j].x)
                    mat[i][j].x=-cnt;
            }
        }
    }
}
if(p[h]=='C')
{
    for(i=1;i<=4;i++)
    {
        for(j=1;j<=4;j++)
        {
            if(!strstr(mat[i][j].s,"~c") && mat[i][j].x!=-cnt)
                mat[i][j].x=cnt;
            else
            {
                if(mat[i][j].x==cnt || !mat[i][j].x)

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        mat[i][j].x=-cnt;
    }
}
}
}
if(p[h]=='D')
{
    for(i=1;i<=4;i++)
    {
        for(j=1;j<=4;j++)
        {
            if(!strstr(mat[i][j].s,"~d") && mat[i][j].x!=-cnt)
                mat[i][j].x=cnt;
            else
            {
                if(mat[i][j].x==cnt || !mat[i][j].x)
                    mat[i][j].x=-cnt;
            }
        }
    }
}
h++;
}
}
for(i=1;i<=4;i++)
{
    for(j=1;j<=4;j++)
    {
        if(mat[i][j].x>0)
            sf[i][j]=1;
    }
}
}

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for(i=1;i<=4;i++)
{
    for(j=1;j<=4;j++)
        mat[i][j].x=0;
}
p=strtok(NULL,"+ ");
}
for(i=1;i<=4;i++)
{
    int n=0;
    for(j=1;j<=4;j++)
    {
        if(sf[i][j])
            n+=pow(2,4-j);
    }
    if(n%16==15)
        fout<<"F";
    if(n%16==14)
        fout<<"E";
    if(n%16==13)
        fout<<"D";
    if(n%16==12)
        fout<<"C";
    if(n%16==11)
        fout<<"B";
    if(n%16==10)
        fout<<"A";
    if(n%16==9)
        fout<<"9";
    if(n%16==8)
        fout<<"8";
    if(n%16==7)
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    fout<<"7";
if(n%16==6)
    fout<<"6";
if(n%16==5)
    fout<<"5";
if(n%16==4)
    fout<<"4";
if(n%16==3)
    fout<<"3";
if(n%16==2)
    fout<<"2";
if(n%16==1)
    fout<<"1";
if(n%16==0)
    fout<<"0";
}
fout<<"\n";
for(i=1;i<=4;i++)
    for(j=1;j<=4;j++)
        sf[i][j]=0;
}
return 0;
}
```