#include <stdio.h>

#include <math.h>

double sintheta(double p,double q,double x1,double y1)

{

double up,down;

up=y1\*p\*p;

down=sqrt(pow(y1,2)\*pow(p,4)+pow(x1,2)\*pow(q,4));

if((x1\*y1)>=0)

{

printf("%lf sinth \n",up/down);

return up/down;

}

if((x1\*y1)<0)

{

printf("%lf sinth \n",-1\*up/down);

return -1\*up/down;

}

}

double costheta(double p,double q,double x1,double y1)

{

double up,down;

up=x1\*q\*q;

down=sqrt(pow(y1,2)\*pow(p,4)+pow(x1,2)\*pow(q,4));

printf("%lf costh \n",up/down);

return up/down;

}

double sinpi(double a, double b, double x1, double y1, double sinth, double costh)

{

double up,down;

up=(a-x1)\*costh+(b-y1)\*sinth;

down=sqrt(pow((a-x1),2)+pow((b-y1),2));

printf("%lf sinpi \n",up/down);

return up/down;

}

double cospi(double a, double b, double x1, double y1, double sinth, double costh)

{

double up,down;

up=(b-y1)\*costh-(a-x1)\*sinth;

down=sqrt(pow((a-x1),2)+pow((b-y1),2));

printf("%lf cospi \n",up/down);

return up/down;

}

double c(double sp,double st,double cp,double ct,double a,double b,double p,double q)

{

double up,down;

if (a>0&&b>0)

{

up=(3\*cp\*sp\*ct-st\*(3\*cp\*cp-1))\*b\*p\*p-(3\*cp\*sp\*st+ct\*(3\*cp\*cp-1))\*a\*q\*q;

down=sqrt(pow(a\*q\*q,2)+pow(b\*p\*p,2));

}

else if(a<0&&b>0)

{

up=(3\*cp\*sp\*ct-st\*(3\*cp\*cp-1))\*b\*p\*p-(3\*cp\*sp\*st+ct\*(3\*cp\*cp-1))\*a\*q\*q;

down=sqrt(pow(a\*q\*q,2)+pow(b\*p\*p,2));

}

else if(a>0&&b<0)

{

up=(3\*cp\*sp\*ct-st\*(3\*cp\*cp-1))\*b\*p\*p-(3\*cp\*sp\*st+ct\*(3\*cp\*cp-1))\*a\*q\*q;

down=sqrt(pow(a\*q\*q,2)+pow(b\*p\*p,2));

}

else if(a<0&&b<0)

{

up=(3\*cp\*sp\*ct-st\*(3\*cp\*cp-1))\*b\*p\*p-(3\*cp\*sp\*st+ct\*(3\*cp\*cp-1))\*a\*q\*q;

down=sqrt(pow(a\*q\*q,2)+pow(b\*p\*p,2));

}

printf("%lf const \n",up/down);

return up/down;

}

double inverse(double hall,double constant)

{

double cc=hall/constant;

if(cc>10.3333&&cc<450)

{

return -9\*pow(10,-7)\*pow(cc,3)+0.0007\*cc\*cc-0.1886\*cc+19.83;

}

else if(cc<10.3333)

{

return 0.3023\*cc\*cc-5.3941\*cc+43.462;

}

else if (cc>450)

return 4;

}

double magneticfield(double constant, double r)

{

if (r<=20)

{

return (0.017\*pow(r,4)-1.0533\*pow(r,3)+24.042\*pow(r,2)-243.87\*r+975.88)\*constant;

}

else if(r>20)

{

return (-0.4833\*r+19.167)\*constant;

}

}

int main(void)

{

double a,b,p,q,x1,y1,hall,r,rafter,magnet,hallafter;

printf("a,b,p,q,x1,y1,hall,hallafter을 순서대로 입력하시오.");

scanf("%lf %lf %lf %lf %lf %lf %lf %lf",&a,&b,&p,&q,&x1,&y1,&hall,&hallafter);

double st,ct,sp,cp,constant;

st=sintheta(p,q,x1,y1);

ct=costheta(p,q,x1,y1);

sp=sinpi(a,b,x1,y1,st,ct);

cp=cospi(a,b,x1,y1,st,ct);

constant=c(sp,st,cp,st,a,b,p,q);

r=inverse(hall,constant);

rafter=inverse(hallafter,constant);

printf("%lf : r\n",r);

printf("%lf : rafter\n",rafter);

printf("%lf : delta-r",rafter-r);

///magnet=magneticfield(constant,r);

///printf("%lf \n",magnet);

}

/// 데이터 26.03 -10.93 30 22 22.74 -14.34 234 100

/// 데이터 8.594 -21.078 30 22 3.008 -21.889 100 50