#include<bits/stdc++.h>

#include <math.h>

using namespace std;

int degree, eq[100], j = 0;

double e, x[100];

double horner(double x)

{

double p;

p = eq[0];

for(int i = 1; i <=degree; i++){

p = p\*x +eq[i];

}

return p;

}

double secant(){

double fx1, fx2, fx, x1, x2;

int i = 2;

x1 = x[0];//x(i-1)

x2 = x[1];//x(i)

fx1 = horner(x1);

fx2 = horner(x2);

cout<<"\nIteration Xi-1 Xi Xi+1 f(i-1) f(i) f(root)";

while(1){

j++;

x[i] = x2 -((fx2\*(x2-x1))/(fx2-fx1));

fx = horner(x[i]);//x(i+1)

printf("\n %d %lf %lf %lf %lf %lf %lf", j, x1, x2, x[i], fx1, fx2, fx);

if(fx == 0){

return x[i];

}

else{

i++;

x2 = x[i-1];

x1 = x[i-2];

fx2 = horner(x2);

fx1 = horner(x1);

}

if(fabs(fx)<e)

{

return x2;

}

}

}

int main(){

double root;

cout<<"ENTER THE TOTAL NO. OF POWER: ";

cin>>degree;

cout<<"\n";

for(int i = 0; i <=degree; i++){

cout<<"x^"<<i<<"::";

cin>>eq[i];

cout<<endl;

}

cout<<"THE POLYNOMIAL IS ::: "<<eq[0]<<"x^2"<<eq[1]<<"x"<<eq[2]<<endl;

cout<<"INTIAL X0----> ";

cin>>x[0];

cout<<"X1----> ";

cin>>x[1];

printf("Enter the value of error: ");

cin>>e;

root = secant();

cout<<endl;

cout<<"Approximate Root using secant: "<<root<<endl;

return 0;

}