clc

clear all

syms x y

a=input('Enter the value of a: ');

h=input('Enter the value of h: ');

f=input('Enter the f(x,y): ');

x0=input('Enter the boundary value on X axis: ');

y0=input('Enter the boundary value on Y axis: ');

x1=input('Enter the boundary value on X=a: ');

y1=input('Enter the boundary value on Y=a: ');

p=input('Enter the coeficient of Uxx: ');

q=input('Enter the coeficient of Uyy: ');

r=input('Enter the coeficient of Ux: ');

s=input('Enter the coeficient of Ux: ');

n= a/h - 1;

X=(-2\*p/h^2 + -2\*q/h^2 + r/h + s/h)\*eye(n^2);

A=linspace(0,a,n+2);

B=linspace(0,a,n+2);

for i=1:n^2-n

X(i,i+n)=p/h^2;

X(i+n,i)=p/h^2-r/h;

end

for i=1:n^2-1

if mod(i,n)==0

X(i,i+1)=0;

X(i+1,i)=0;

else

X(i,i+1)=q/h^2;

X(i+1,i)=q/h^2-s/h;

end

end

disp(X)

Y=ones(n^2,1);

for i=2:n+1 %y

for j=2:n+1 %x

if i==2

if j==2

Y((j-1)+(i-2)\*n,1)=subs(subs(f,x,A(2)),y,B(2)) -x0-y0;

elseif j==n+1

Y((j-1)+(i-2)\*n,1)=subs(subs(f,x,A(n+1)),y,B(2))-x0-x1;

else

Y((j-1)+(i-2)\*n,1)=subs(subs(f,x,A(j)),y,B(2))-x0;

end

elseif i~=2 && i~=n+1

if j==2

Y((j-1)+(i-2)\*n,1)=subs(subs(f,x,A(2)),y,B(i))-y0;

elseif j==n+1

Y((j-1)+(i-2)\*n,1)=subs(subs(f,x,A(2)),y,B(2))-x1;

else

Y((j-1)+(i-2)\*n,1)=subs(subs(f,x,A(j)),y,B(i));

end

else

if j==2

Y((j-1)+(i-2)\*n,1)=subs(subs(f,x,A(2)),y,B(n+1))-y0-y1;

elseif j==n+1

Y((j-1)+(i-2)\*n,1)=subs(subs(f,x,A(n+1)),y,B(n+1))-x1-y1;

else

Y((j-1)+(i-2)\*n,1)=subs(subs(f,x,A(j)),y,B(n+1))-y1;

end

end

end

end

disp(Y)

Z=inv(X)\*Y;

disp(Z)