clear

x=[16 9 4 1];

y=[1 2 3 4];

dy=[1/2 1/8];

xx=5;

n = length(x);

for i = 1:n-1

h(i) = x(i+1)-x(i);

end

for i = 1:n-2

lemda(i) = h(i+1)/(h(i)+h(i+1));

end

for i = 1:n-2

miu(i) = 1 - lemda(i);

end

x2=x(1:2);

y2=y(1:2);

n1=length(x2);

data=zeros(n1);

for j = 1:n1

for i = 1:n1

if j == 1

data(i,1) = y2(i);

else

if i + j - 1<=n1

data(i+j-1,j) = (data(i + j - 2,j-1)-data(i + j - 1,j-1))...

/(x2(i + j - 1 - (j - 1))-x2(i + j - 1));

else

break;

end

end

end

end

temp1 = diag(data)';

x3=x(n-1:n);

y3=y(n-1:n);

n1=length(x3);

data=zeros(n1);

for j = 1:n1

for i = 1:n1

if j == 1

data(i,1) = y3(i);

else

if i + j - 1<=n1

data(i+j-1,j) = (data(i + j - 2,j-1)-data(i + j - 1,j-1))...

/(x3(i + j - 1 - (j - 1))-x3(i + j - 1));

else

break;

end

end

end

end

temp2 = diag(data)';

d=[];

d(1) = 6\*(temp1(2)-dy(1))/h(1);

d(n) = 6\*(temp2(2)-dy(2))/(-h(n-1));

for i = 2:n-1

%²îÉÌ3

x4=x(i-1:i+1);

y4=y(i-1:i+1);

n1=length(x4);

data=zeros(n1);

for j = 1:n1

for t = 1:n1

if j == 1

data(t,1) = y4(t);

else

if t + j - 1<=n1

data(t+j-1,j) = (data(t + j - 2,j-1)-data(t + j - 1,j-1))...

/(x4(t + j - 1 - (j - 1))-x4(t + j - 1))

else

break;

end

end

end

end

temp3 = diag(data)'

d(i) = 6\*temp3(3);

end

A = zeros(n,n);

A(1,2) = 1;

A(n,n-1) = 1;

for i = 1:n

A(i,i) = 2;

if i>=2 && i <=n-1

A(i,i+1) = lemda(i-1);

A(i,i-1) = miu(i-1);

end

end

M = d/A;

syms xi

S=[];

x

y

for i = 1:3

s = M(i)\*(x(i+1)-xi)/(6\*h(i)) + M(i+1)\*(xi-x(i))^3/(6\*h(i))+(y(i)-(M(i)\*h(i)^2)/6)\*(x(i+1)-xi)/h(i) + (y(i+1)-(M(i+1)\*h(i)^2)/6)\*(xi-x(i))/h(i);

s=simplify(s);

S = [S,s];

end

S

yi=[];

for i = 1:n-1

if x(i) < xx && x(i+1) > xx

yi = vpa(subs(S(i),'xi',xx),4);

end

end

结论：

S =

[ (2529868247415829\*(xi - 16)^3)/378302368699121664 - (1810683075587492232911\*xi)/2059856397566717460480 + 25140730959683328226631/2059856397566717460480, (90578902459929083\*xi)/270215977642229760 - (1678105201007903\*(xi - 9)^3)/135107988821114880 + 7201505708749297/67553994410557440, (2378794554400459\*(xi - 4)^3)/81064793292668928 - (61855590361890325\*xi)/81064793292668928 + 450342216501378421/81064793292668928]