

數值方法 hw1

A

code

```
X = [-1,-0.8,-0.6,-0.4,-0.2,0,0.2,0.4,0.6,0.8,1]
Y = [0.0385,0.0588,0.1,0.2,0.5,1,0.5,0.2,0.1,0.0588,0.0385]
n = length(X);
Lj = zeros(n);
L = zeros(1,n);
% calculating part
jr = 1:n;
for j = jr
    i = jr(jr~=j);
    Lj(j, :) = poly(X(i)) / polyval(poly(X(i)), X(j));
end
L = Y*Lj;
% plotting part
x = -1: 0.002: 1;
for i = 1:n
    figure(i);
    plot(x, polyval(Y(i)*Lj(i,:), x)), xlabel('x'), ylabel('y')
    xlim([-1 1]), ylim([-0.5 1.5])
endfor
figure(n+1);
hold on
plot(x,polyval(L,x),'k','linewidth',2)
plot(X,Y,'ro','linewidth',2,'markersize',10)
hold off
xlim([-1 1]), ylim([-0.5 1.5]), xlabel('x'), ylabel('y')
figure(n+2);
hold on
for i = 1:n
    plot(x, polyval(Y(i)*Lj(i,:),x))
endfor
plot(x, polyval(L,x),'k', 'linewidth', 2)
plot(X, Y, 'ro', 'linewidth', 2, 'markersize',10)
hold off
xlim([-1 1]), ylim([-0.5 1.5]), xlabel('x'), ylabel('y')
```

result

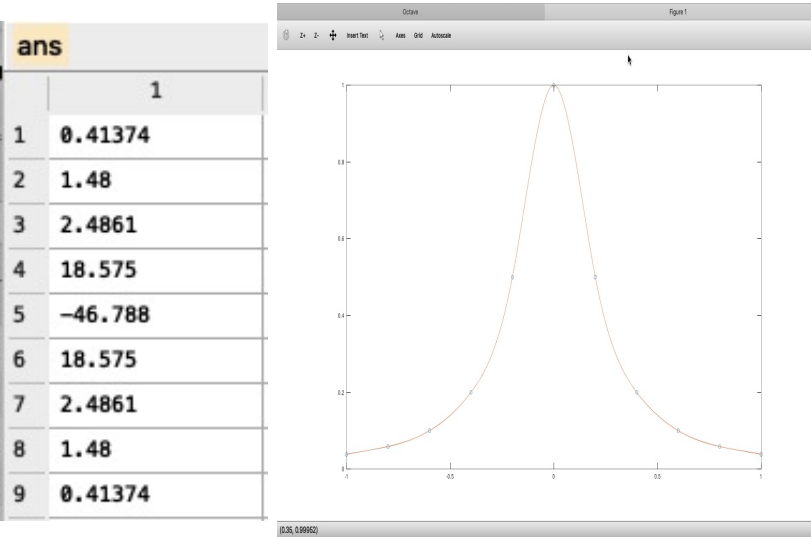


B

code:

```
filename = 'hw1AB.dat'
[X, Y]=textread(filename,'%f %f','HeaderLines',1)
n = length(X);
matrix = zeros(n-2, n-2);
% calculating part
% set up matrix
for i = 2 : n-1
for j = 2 : n-1
if i == j
matrix(i-1,j-1) = (X(i+1)-X(i-1))/3;
elseif i-j == 1
matrix(i-1,j-1) = (X(i+1)-X(i))/6;
elseif i- j == -1
matrix(i-1,j-1) = (X(i+1)-X(i))/6;
end
end
end
b=zeros(9,1);
for i=1:9
    b(i) = (Y(i+2)-Y(i+1)) / (X(i+2)-X(i+1)) - (Y(i+1)-Y(i)) / (X(i+1)-X(i))
end
ans = pinv(matrix) * b
% plootting part
x = -1: 0.002: 1;
y=spline(X,Y,x);
figure(1)
plot(X,Y,"o",x,y)
```

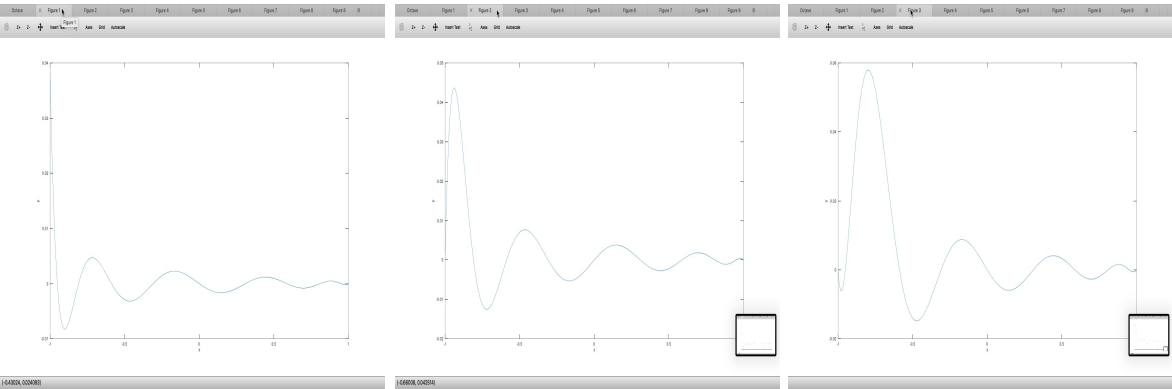
result

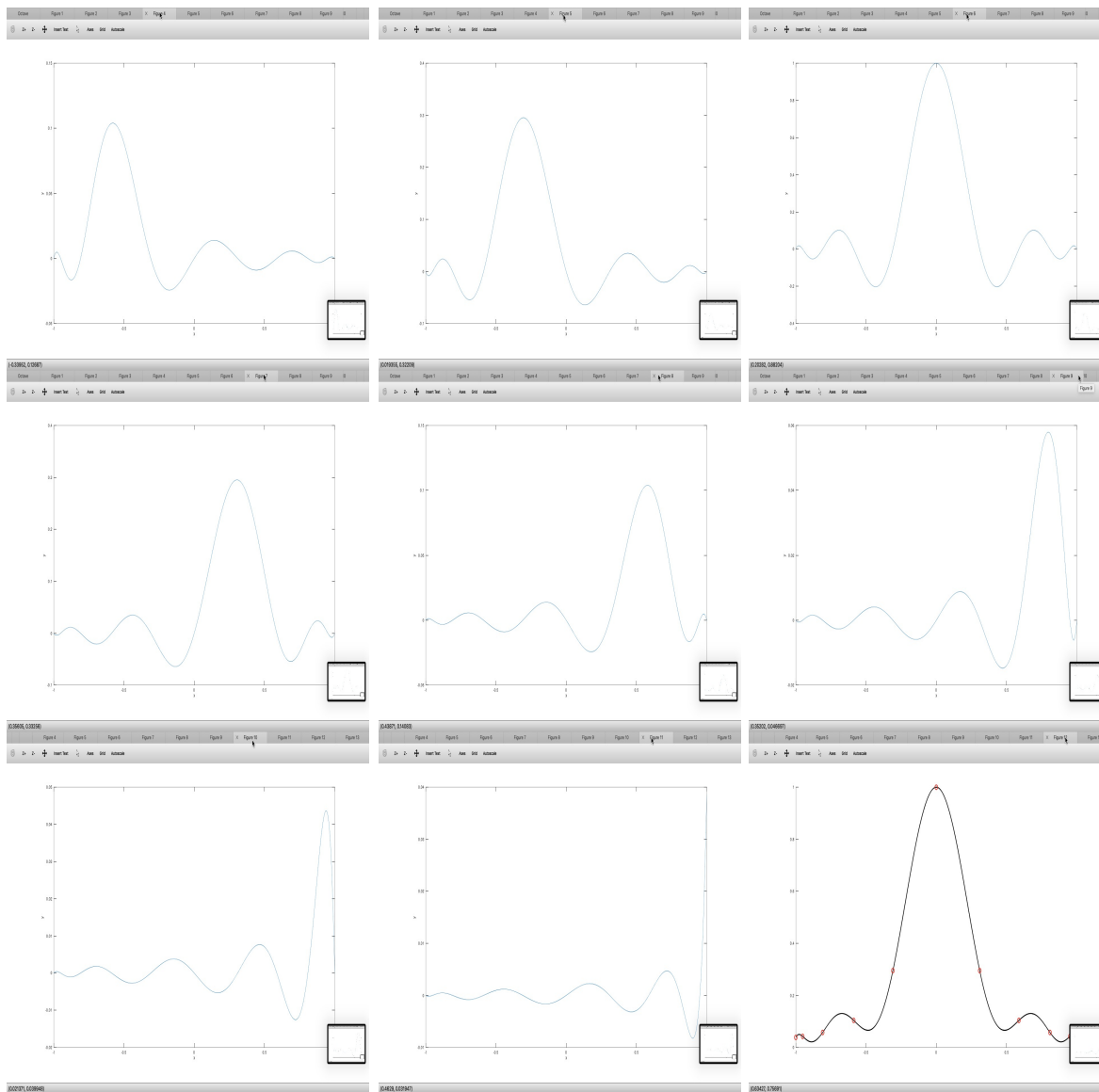


C

code: 同A (將X Y值改為
X = [-1, -0.9511, -0.8090, -0.5878, -0.3090, 0.0, 0.3090, 0.5878, 0.8090, 0.9511, 1.0]
Y = [0.0385, 0.0424, 0.0576, 0.1038, 0.2952, 1.0, 0.2952, 0.1038, 0.0576, 0.0424, 0.0385])

result:





D

code: 同B (將filename改為hw1CD.dat)

result

answer	
	1
1	0
2	-0.13415
3	1.5096
4	-2.1089
5	16.646
6	-30.468
7	16.646
8	-2.1089
9	1.5096
10	-0.13415
11	0

