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clc;
clear all;
x=[0 0.4 0.8 1.2 1.6];
y=[-0.8145 -0.4866 0.2236 0.9687 0.1874];
p=polyfit(x,y,4);
x1=0:0.1:1.6;
f1 = polyval(p,x1);
plot(x1,f1,'--or');
hold on;
fplot(@(x) sin(exp(x))-2),[0 1.6],'b:');
xlabel('x');
ylabel('y');
legend('Interpolated polynomial with degree=4','original function','Location','Best');
title('Plot of original function and interpolated polynomial');

q = polyint(p);
I = diff(polyval(q,[0 1.6]));
display('Integration result using polyint MATLAB function');
fprintf('The result of integration of interpolating polynomial over the domain is %f\n\n',I);

q_hand=[-0.39514 0.959275 -0.399 0.40555 -0.8145 0];
I = diff(polyval(q_hand,[0 1.6]));
display('Evaluation of integration by hand and limit substitution using polyval');
fprintf('The result of integration of interpolating polynomial over the domain is %f\n',I); %I belive it is a good estimate as we have precison upto 2 significant

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Integration result using polyint MATLAB function  
The result of integration of interpolating polynomial over the domain is 0.243924

Evaluation of integration by hand and limit substitution using polyval  
The result of integration of interpolating polynomial over the domain is 0.244065



