E.1

clear

clc

x=1:7/8:8

f=zeros(1,9)

for i=1:9

f(i)=log(x(i))./x(i)

end

myanswer=7/8/3\*(f(1)+f(9)+2\*(f(3)+f(5)+f(7))+4\*(f(2)+f(4)+f(6)+f(8)))

error=abs(2.1620386-myanswer)

E.2

[x,w]=gauss\_leg(1,8,9)

for i=1:9

y=y+w(i).\*log(x(i))./x(i);

end

z=abs(y-2.1620386);

C.2

clear

clc

h1=0:pi/4:pi

h2=0:pi/8:pi

h3=0:pi/16:pi

h4=0:pi/32:pi

g1=g2=g3=g4=0;

for i=1:2:3

g1=g1+((pi/4)^3)/24\*sin(h1(i))+(pi/4)^3/12\*sin(h1(i+1))+(pi/4)^3/24\*sin(h1(i+2))+1/2\*(pi/4)\*(sin(h1(i))+2\*sin(h1(i+1))+sin(h1(i+2)));

end

for i=1:2:7

g2=g2+((pi/8)^3)/24\*sin(h2(i))+(pi/8)^3/12\*sin(h2(i+1))+(pi/8)^3/24\*sin(h2(i+2))+1/2\*(pi/8)\*(sin(h2(i))+2\*sin(h2(i+1))+sin(h2(i+2)));

end

for i=1:2:15

g3=g3+((pi/16)^3)/24\*sin(h3(i))+(pi/16)^3/12\*sin(h3(i+1))+(pi/16)^3/24\*sin(h3(i+2))+1/2\*(pi/16)\*(sin(h3(i))+2\*sin(h3(i+1))+sin(h3(i+2)));

end

for i=1:2:31

g4=g4+((pi/32)^3)/24\*sin(h4(i))+(pi/32)^3/12\*sin(h4(i+1))+(pi/32)^3/24\*sin(h4(i+2))+1/2\*(pi/32)\*(sin(h4(i))+2\*sin(h4(i+1))+sin(h4(i+2)));

end

f=2;

error1=log10(abs(g1-f))

error2=log10(abs(g2-f))

error3=log10(abs(g3-f))

error4=log10(abs(g4-f))

x=[pi/4 pi/8 pi/16 pi/32];

y=[error1 error2 error3 error4];

plot(log10(x),y,'-r');

hold on

plot(log10(x),y,"o");

ylabel("log(error)")

xlabel("log(grid spacing)");

print -dpng output.png