程序设计 2

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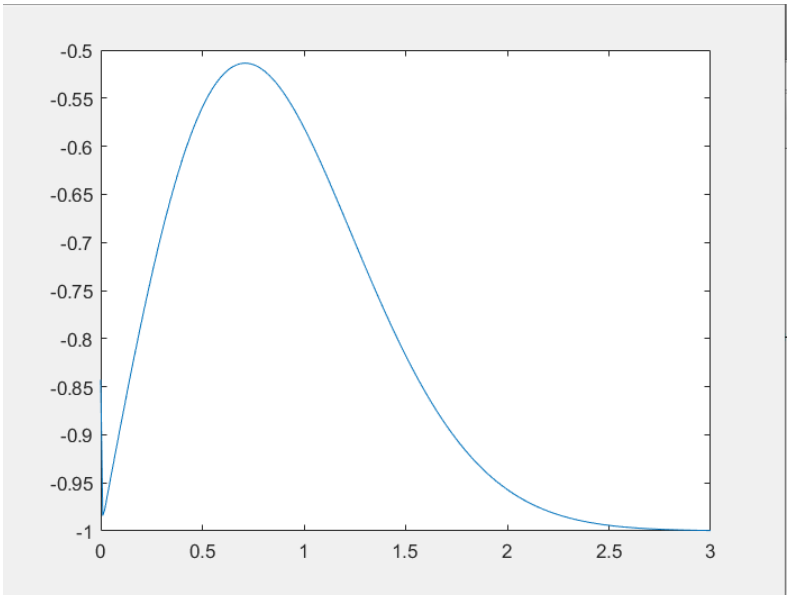
(a)

```
n=300;

y=zeros(1,n+1);erf1=zeros(1,n+1);g=zeros(1,n+1);A=zeros(1,n+1);

for i=0:1:300
    y(i+1)=i/100;
    erf1(i+1)=erf(i/100);
    for k=0:99    %利用复合辛普森法则
g(i+1)=(2/(pi^(1/2)))*(i/600)*(exp(-((k)*(i/100)/100)^2)+4*exp(-
((k+1/2)*(i/100)/100)^2)+exp(-((k+1)*(i/100)/100)^2));
    end
    A(i+1)=g(i+1)-erf(i+1);
end
plot(y,A)
```

运行结果



(b) 运行代码

```
function  s = Simpson(a,b)
c = (b+a)/2;
s = (f(a) + 4*f(c) + f(b))*(b-a)/6;
end
```

```
function myfun = f(s)
myfun = exp(-(s^2))*2/sqrt(pi);
end
```

```
function  int = Simpsonadap(a0,b0,tol0)
int=0; n=1; c{1}=[a0,b0];
while ~isempty(c)
   interval = c{1};
   c(1) = [];
   a = interval(1); b = interval(2);
   m = (b+a)/2;
   n = n+1;
   appab = Simpson(a,b); appam = Simpson(a,m); appmb = Simpson(m,b);
   error = abs(appab - appam - appmb);

   if error < 15*tol0*(b-a)/(b0-a0)
       int = int + appam + appmb;
   else
       c = [c,[a,m]];c = [c,[m,b]];
   end
end
end
```

```
Simpsonadap(0,1,0.000005)
erf(1)
abs(Simpsonadap(0,1,0.000005) - erf(1))

Simpsonadap(0,2,0.000005)
erf(2)
abs(Simpsonadap(0,2,0.000005) - erf(2))

Simpsonadap(0,3,0.000005)
erf(3)
```

```
abs(Simpsonadap(0,3,0.000005) - erf(3))
```

运行结果

Simpsonadap(0,1,0.000005) = 0.842700933572054

Erf(1) = 0.842700792949715

| Simpsonadap(0,1,0.000005)-erf(1)| = 1.406223392175221e-07

误差小于 0.000005

Simpsonadap(0,2,0.000005) = 0.995322539197997

Erf(2) = 0.995322265018953

| Simpsonadap(0,2,0.000005)-erf(2)| = 2.741790444682479e-07

误差小于 0.000005

Simpsonadap(0,3,0.000005) = 0.999978174775306

Erf(3) =0.999977909503001

| Simpsonadap(0,3,0.000005)-erf(3)| = 2.652723046780991e-07

误差小于 0.000005