

積分函數 $f(x)=\exp(-x^2)$,從 0 到 1 等分割 ,得到

1. Rectangle rule(黎曼左右端點)

左端點:0.753120812 誤差: 0.00629668

右端點:0.740478401 誤差: 0.006345731

2. Trapezoidal rule(梯型法)

梯型法:0.746799607189351

誤差: 2.452562e-05

3. Simpsons rule(辛普森)

辛普森:0.746824134120318

誤差:1.3078906846431e-09

```
f<-function(x){exp(-x^2)}
a<-0;b<-1;n<-50
h<-seq(a,b,(b-a)/n)
#Rectangle rule(黎曼左右端點)
right<-0;left<-0
for(i in 2:(n+1)){
  right<-right+f(h[i])*(b-a)/n
  left<-left+f(h[i-1])*(b-a)/n
}
```

```
#Trapezoidal rule(梯型法)
I_T<-0
for(i in 2:(n+1)){
  I_T<-I_T+(f(h[i-1])+f(h[i]))/2
}
I_T<-I_T*(b-a)/n
```

```
#Simpsons rule(辛普森)
if(n%%2==0){
  z1<-0;z2<-0
  for(i in 2:(n/2)){ z1<-z1+2*f(h[2*i-1]) }
  for(i in 1:(n/2)){ z2<-z2+4*f(h[2*i]) }
  I_S<-(f(h[1])+f(h[n+1])+z1+z2)*(b-a)/n/3
  rm(z1,z2)
} else {print("n need to be even")}
```