重要性抽样计算积分

代码实现

```
import numpy as np
import matplotlib.pyplot as plt
AA = 0.0
BB = 20.0
ff = lambda x:x**4*np.exp(-x)
wt1 = lambda x:1.0/(BB-AA)
wt2 = lambda x:np.exp(-x)
wt3 = lambda x:x**3*np.exp(-x)/6.0
wt4 = lambda x:x**4*np.exp(-x)/24.0

max1 = 0.2
max2 = 1.0
max3 = 0.3
max4 = 0.3


list=np.array([])
ic=0
nt=1000
while ic<nt:
    a = np.random.random()*(BB-AA)
    b = np.random.random()*max1
    if b<=wt1(a):
        list = np.append(list,a)
        ic = ic+1
    else:
        pass


ll = 0.0
for i in range(len(list)):
    x = list[i]
    ll += ff(x)/wt1(x)
ll /= len(list)
print('the integral result is:%f'%ll)
```

获得结果

标准差= $\sqrt{\frac{\sum(x_i-\bar{x})^2}{n-1}}$

标准误= $\sqrt{\frac{\sum(x_i-\bar{x})^2}{(n-1)n}}$

	w=1/20	w=x^3*exp(-x)/6
	24.071939	24.21436
	24.558137	23.904522
	25.673075	23.095016
	24.204221	23.992687
	24.621174	24.276869
	24.133534	24.040668
	23.338089	24.30641
	25.253628	23.839668
	23.512028	24.179575
	22.926504	23.134545
均值	24.2292329	23.898432
标准差	2.674158064	1.394480587
标准误	0.84564303	0.440973481