01.

Elliptic (Trapzoidal)

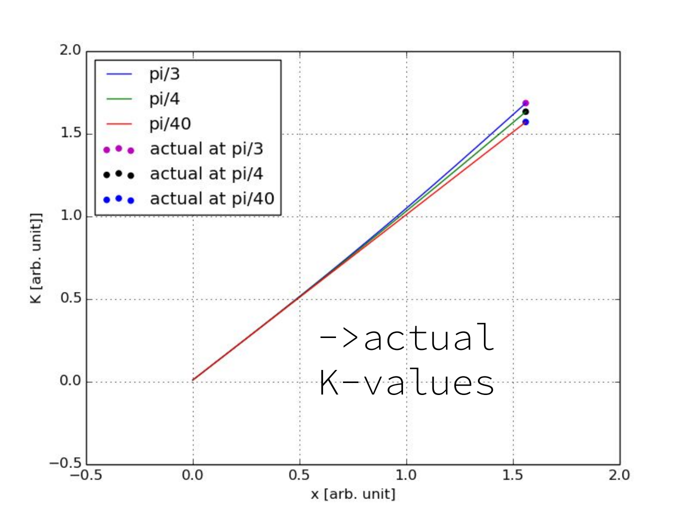
$$T = 4\sqrt{\frac{L}{g}}K\left(\sin\left(\frac{\theta_0}{2}\right)\right),$$

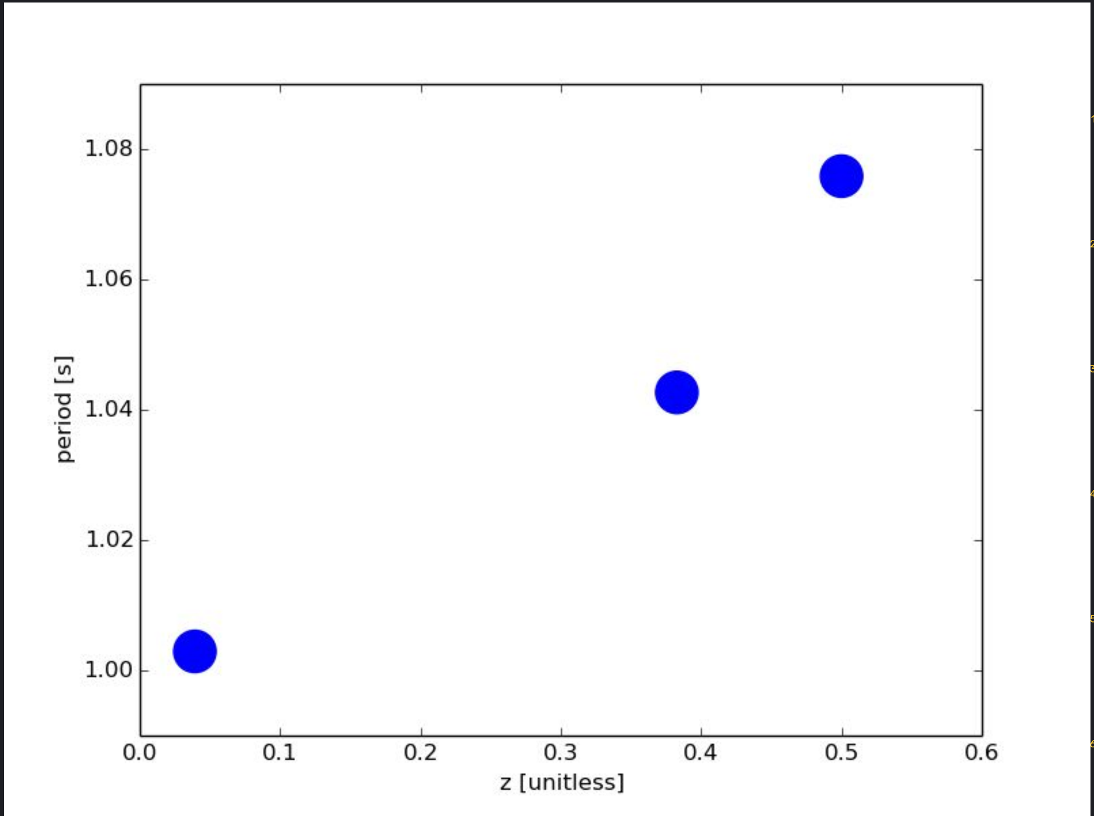
$$\text{where } K(z) = \int_0^{\pi/2} \frac{dx}{\sqrt{1 - z^2 \sin^2(x)}}$$

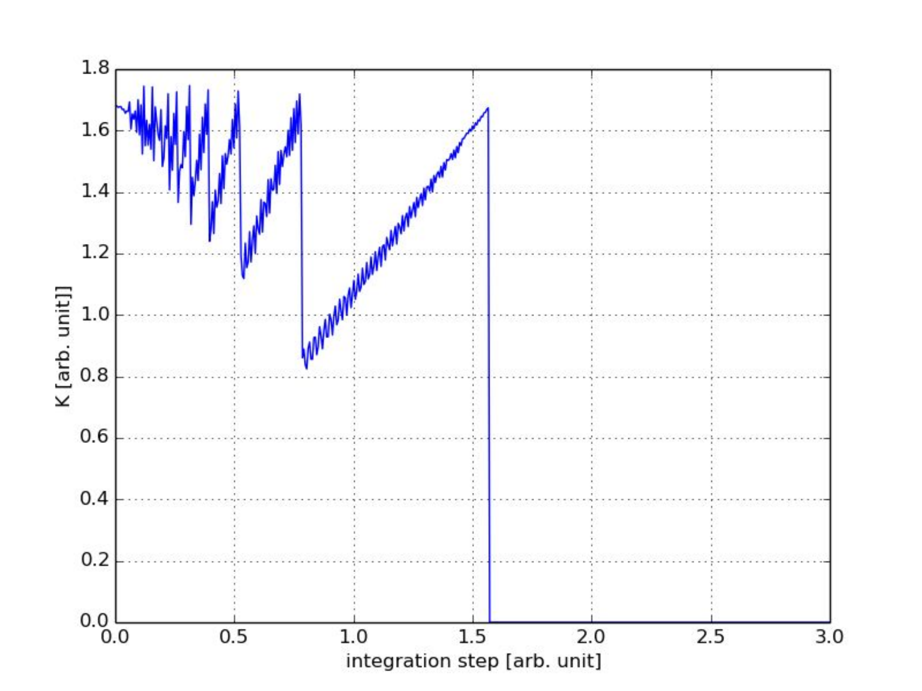
```
theta=pi/3 -> K=1.68575 -> T = 1.07699
theta=pi/4 -> k=1.63359 -> T = 1.0436638
theta=pi/20-> K=1.5714  -> T = 1.00393
Compare to .63888
```

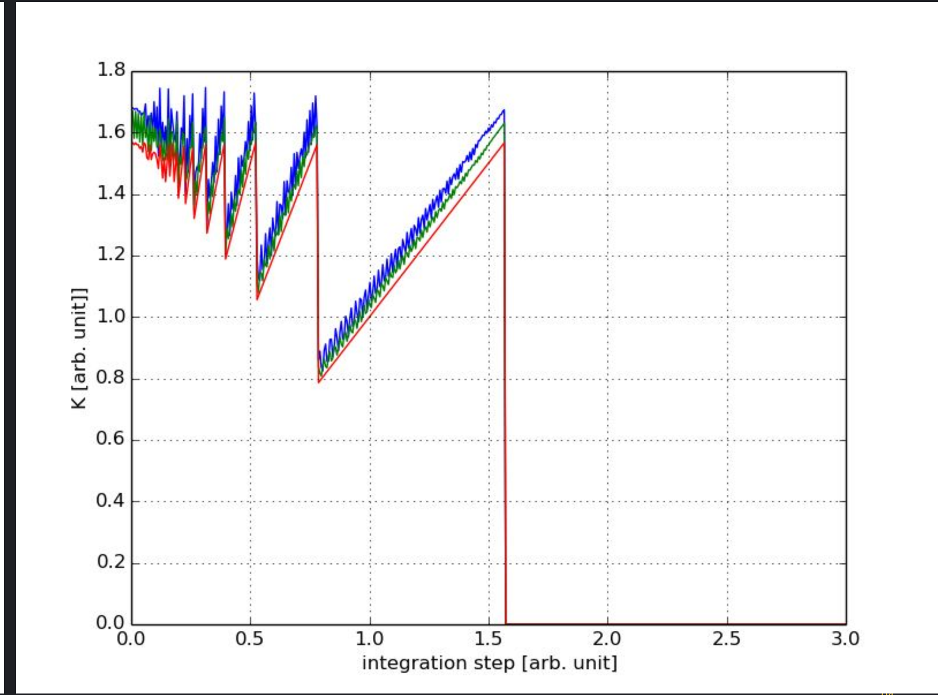
theta=pi/3 -> K=1.68575 -> T = 1.07699
theta=pi/4 -> k=1.63359 -> T = 1.0436638
theta=pi/20-> K=1.5714 -> T = 1.00393
Compare to .63888

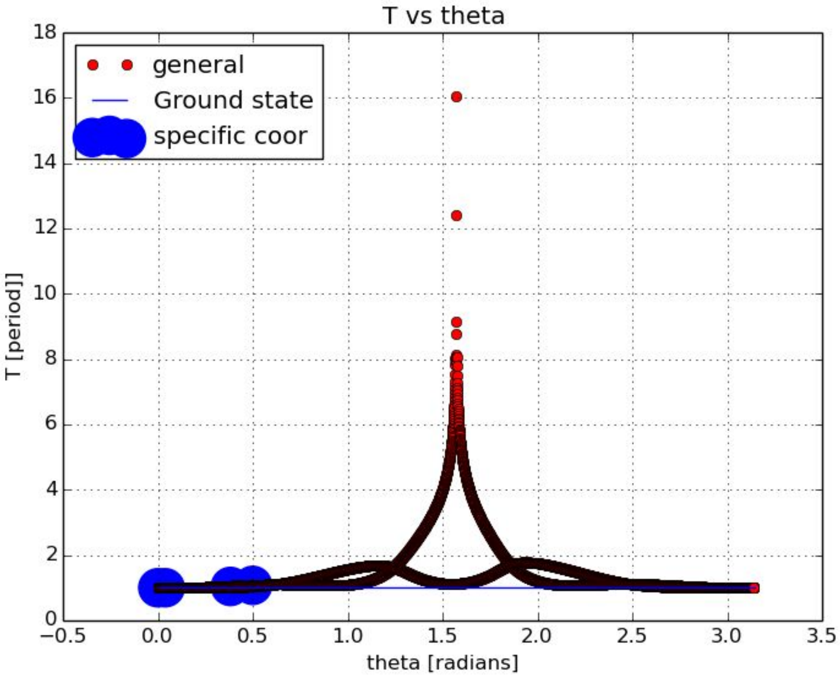
0.50000001261839133	1.0758501309361803
0.38268344246110436	1.0426612945388287
3.9259816851010862E-002	1.0029104619310598
6.9531208250249672E-310	0.63855084315729183

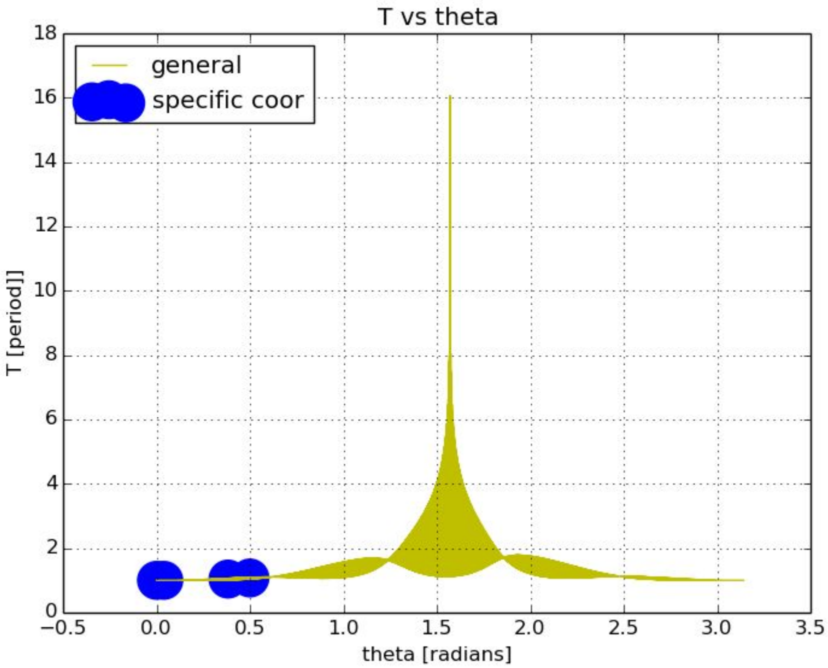





K [arb. unit]]
integration step [arb. unit]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
0.0
0.5
1.0
1.5
2.0
2.5
3.0


K [arb. unit]]
integration step [arb. unit]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
0.0
0.5
1.0
1.5
2.0
2.5
3.0





How the period differs through all theta from 0->pi (dx=.01)

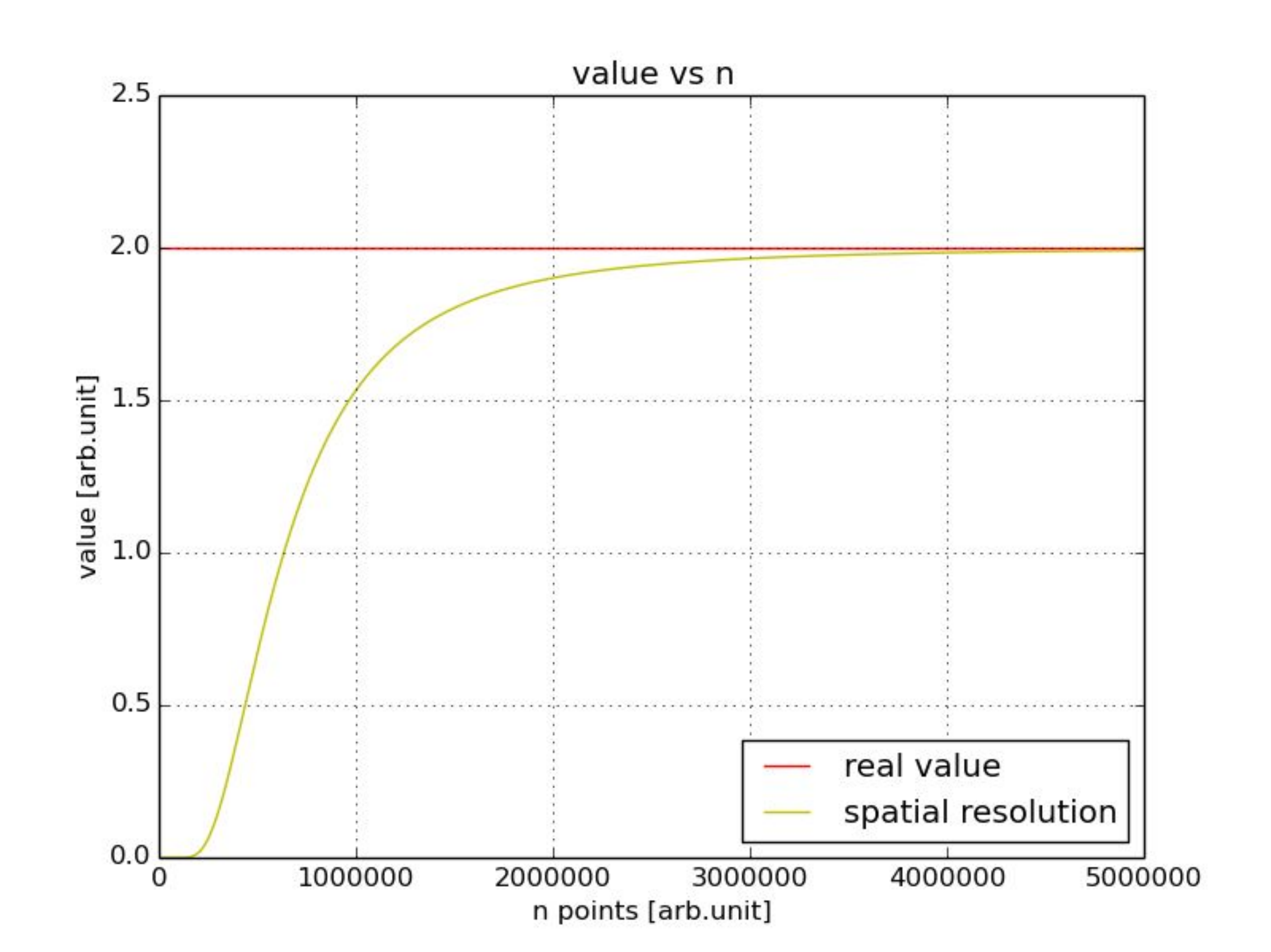
Conclusion

Given a bad initial guess might give noisy data

02.

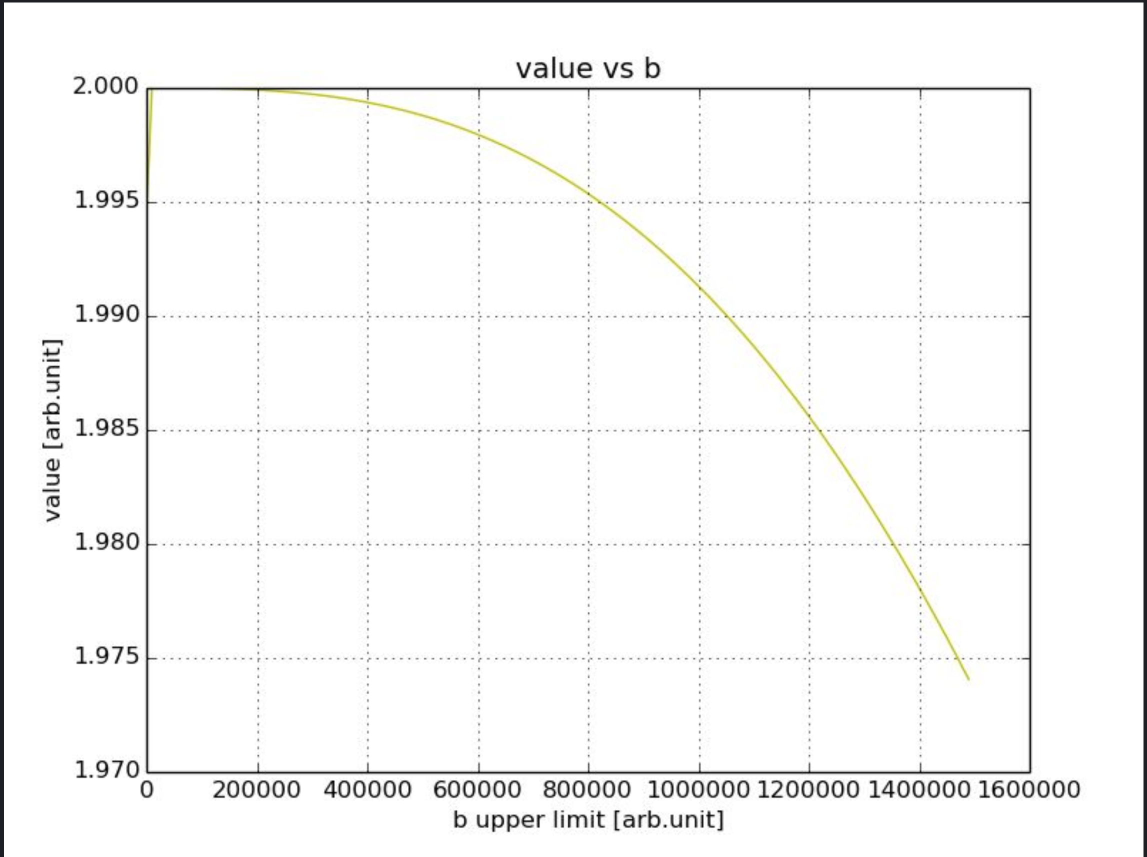
Simpson

$$\int_{0}^{\infty} x^2 e^{-x}\,dx$$



Simpson
method

003-1040559 1250 003-77156.8 1760 0009-14563.7 73273



An interesting pattern here

03

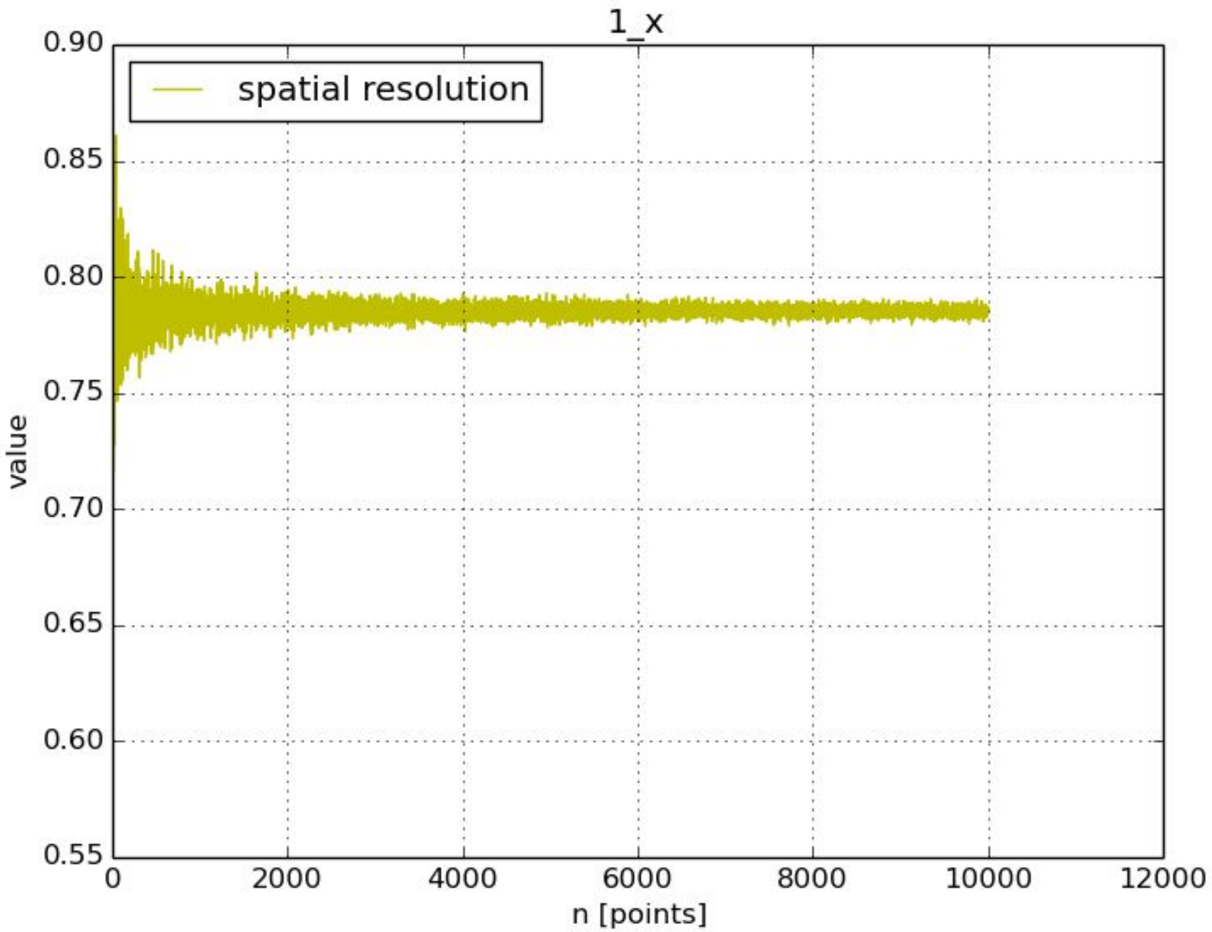
T

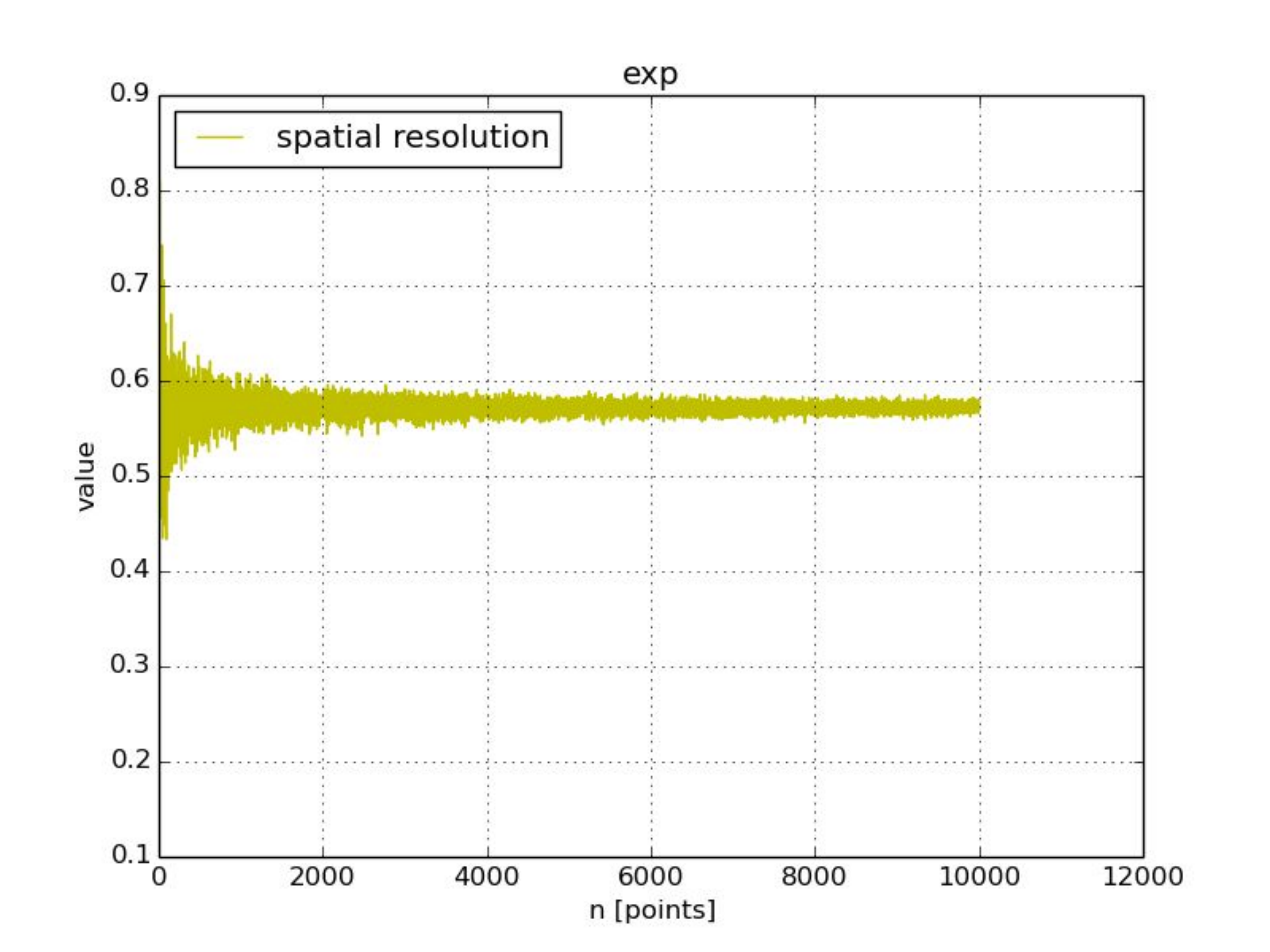
1

(a) $\displaystyle\int_0^2 \frac{\exp\left(-x^2\right)}{\sqrt{3-x}}dx;$

(b) $\displaystyle\int_0^1 \frac{dx}{1+x^2} = \frac{\pi}{4}.$

Investigate how your result depends on a number of random points.


1_x
spatial resolution
value
n [points]
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0
2000
4000
6000
8000
10000
12000

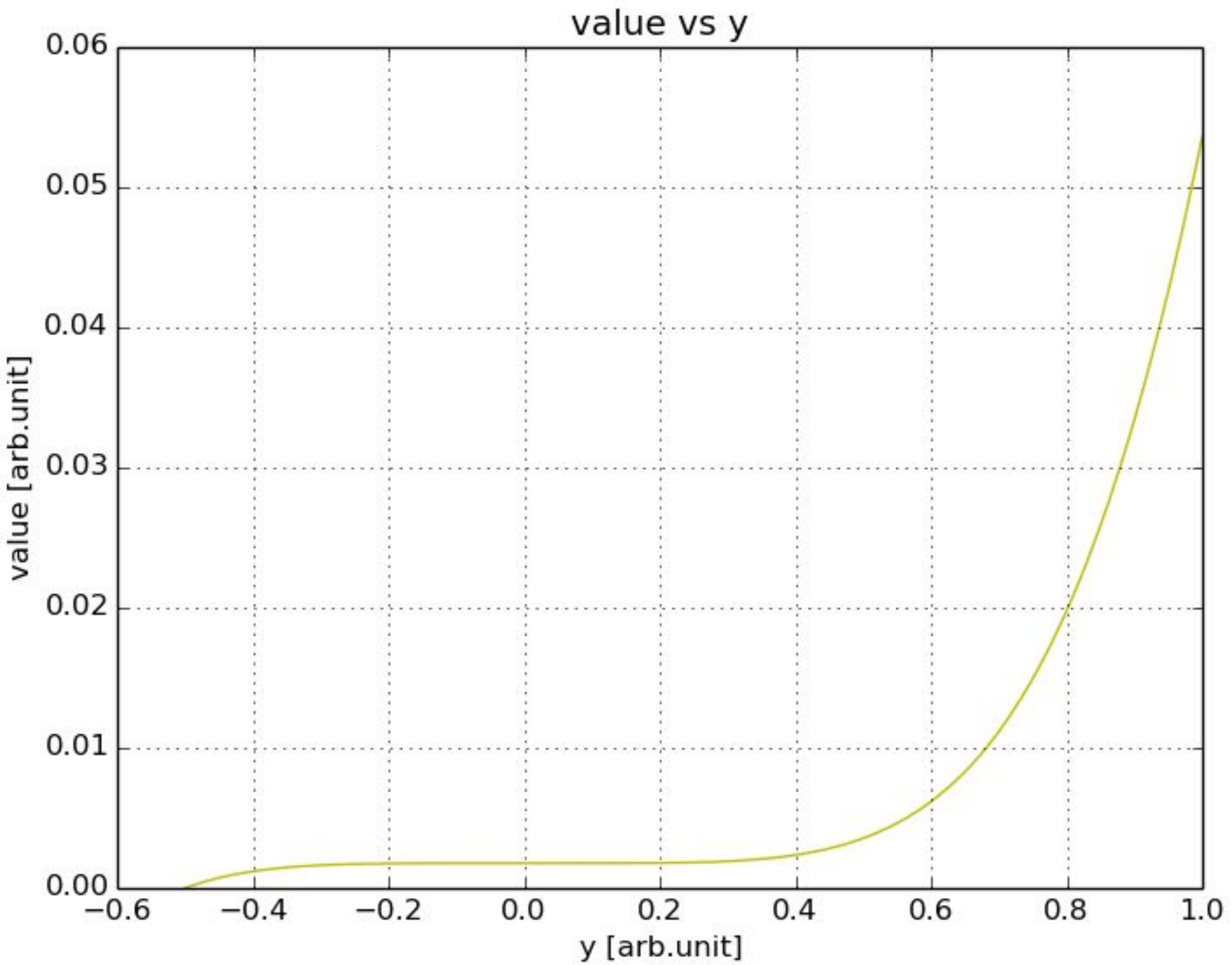


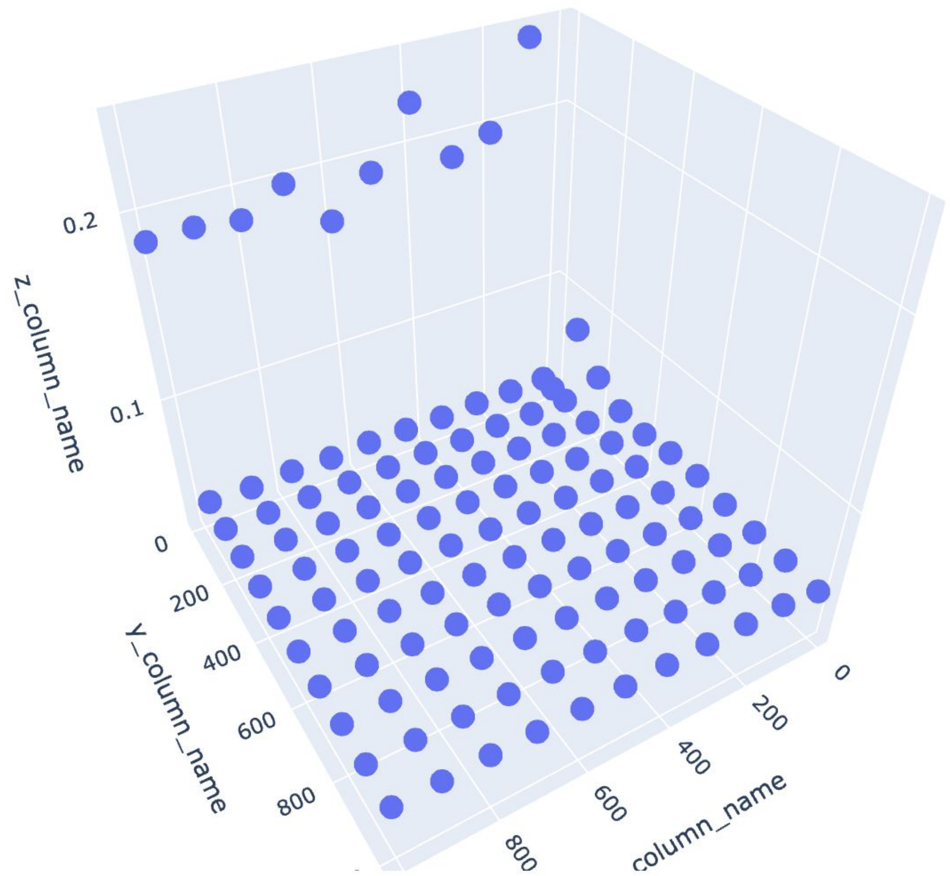
01
02
03
04
05
06

04 05 06

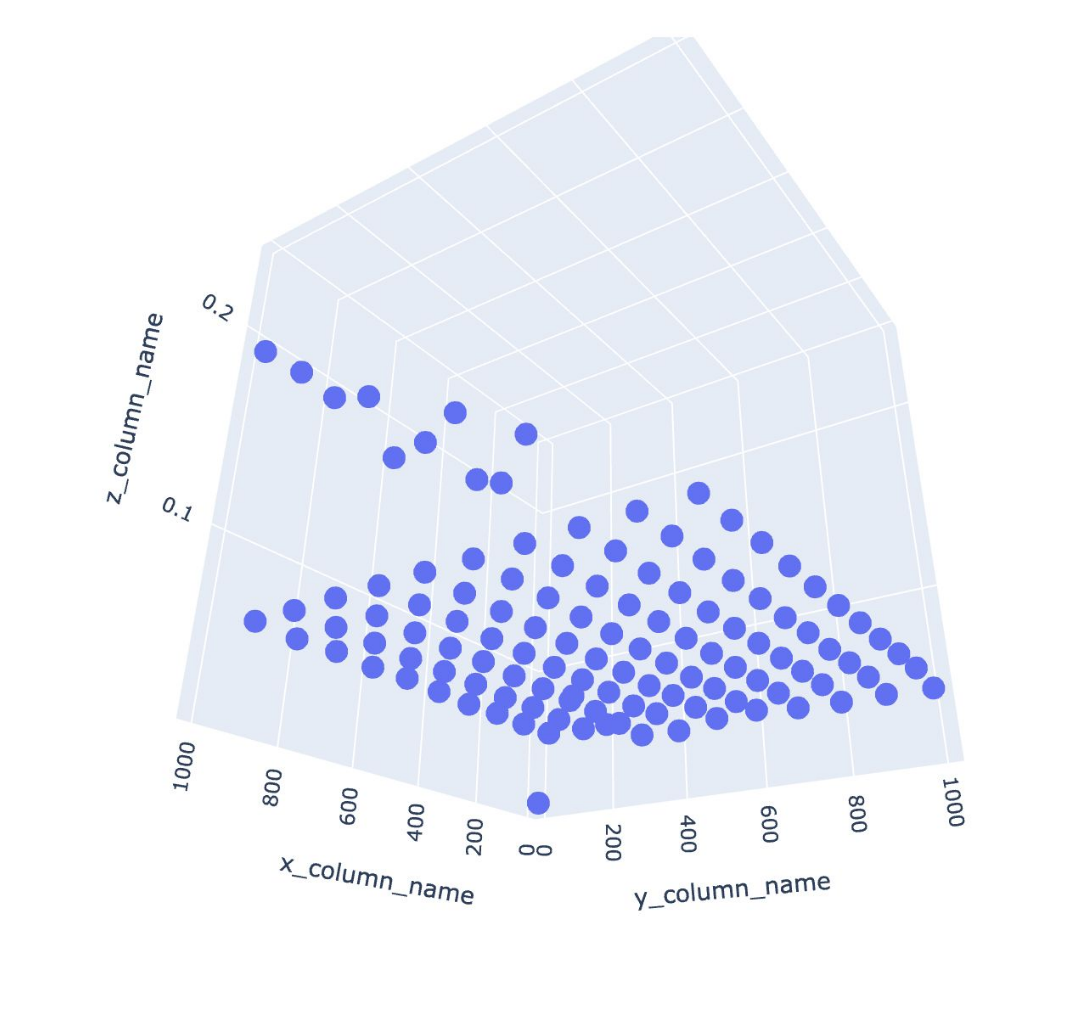
04

$$\int_{-0.5}^{1}\left(\int_{-1}^{1}\sin^{2}\left(x^{3}y^{2}\right)dx\right)dy$$


value vs y
0.06
0.05
0.04
0.03
0.02
0.01
0.00
value [arb.unit]
−0.6
−0.4
−0.2
0.0
0.2
0.4
0.6
0.8
1.0
y [arb.unit]



Combination of monetecarlo And trapzoidal


z_column_name
0.2
0.1
x_column_name
1000
800
600
400
200
0
y_column_name
0
200
400
600
800
1000