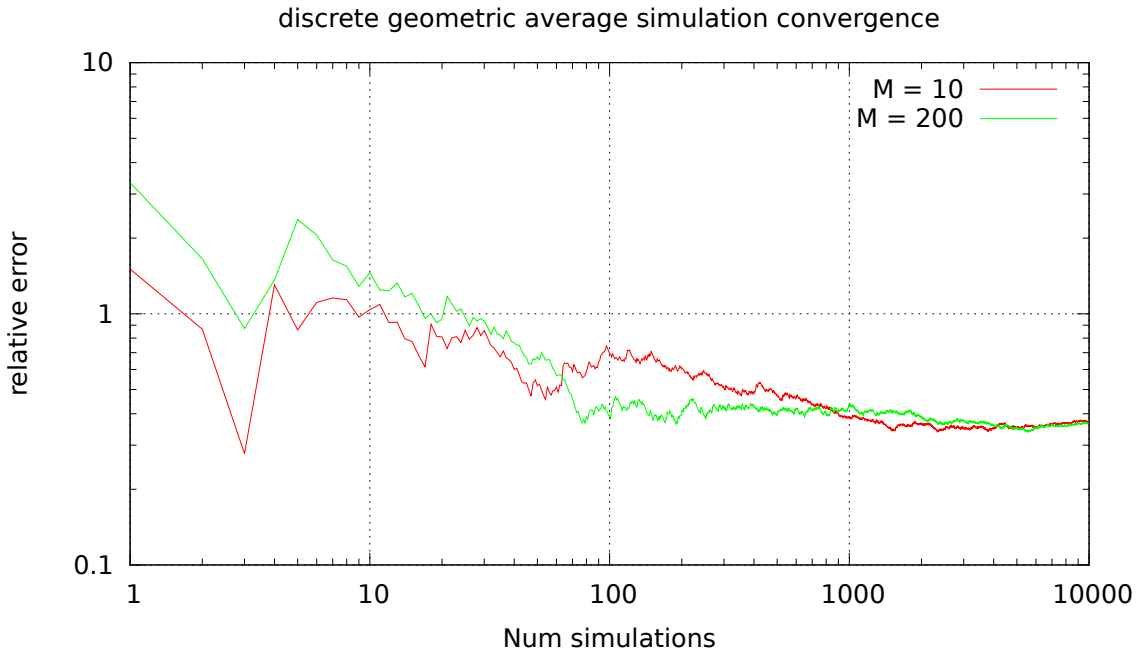
Sheet 3 - Answers

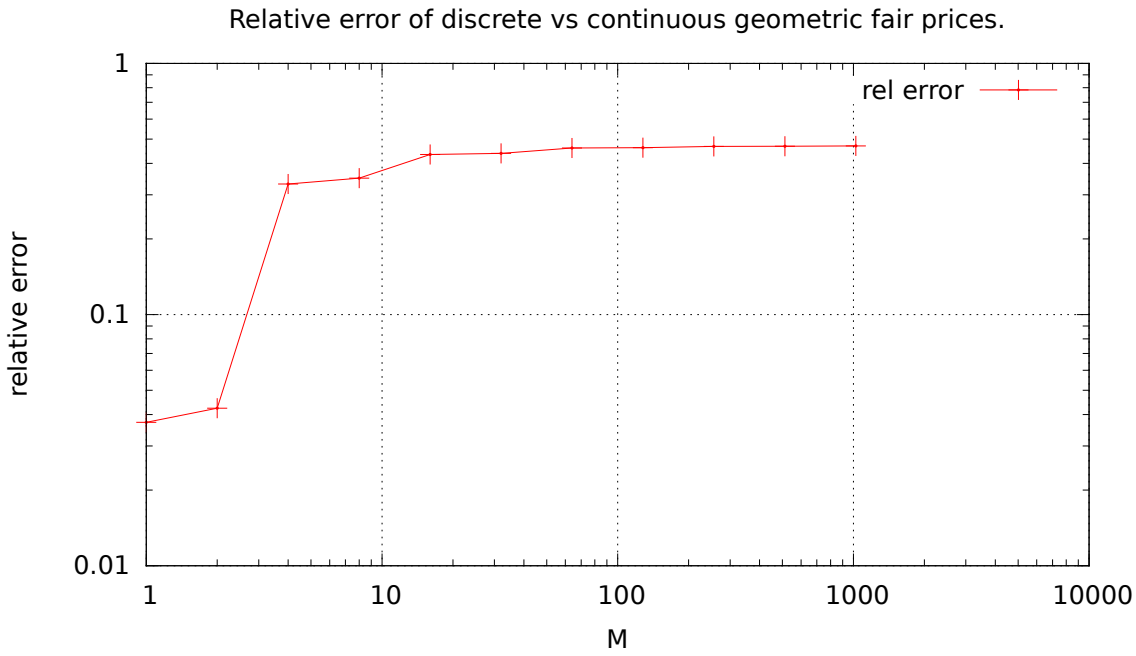
Timm & Boris

June 2, 2014

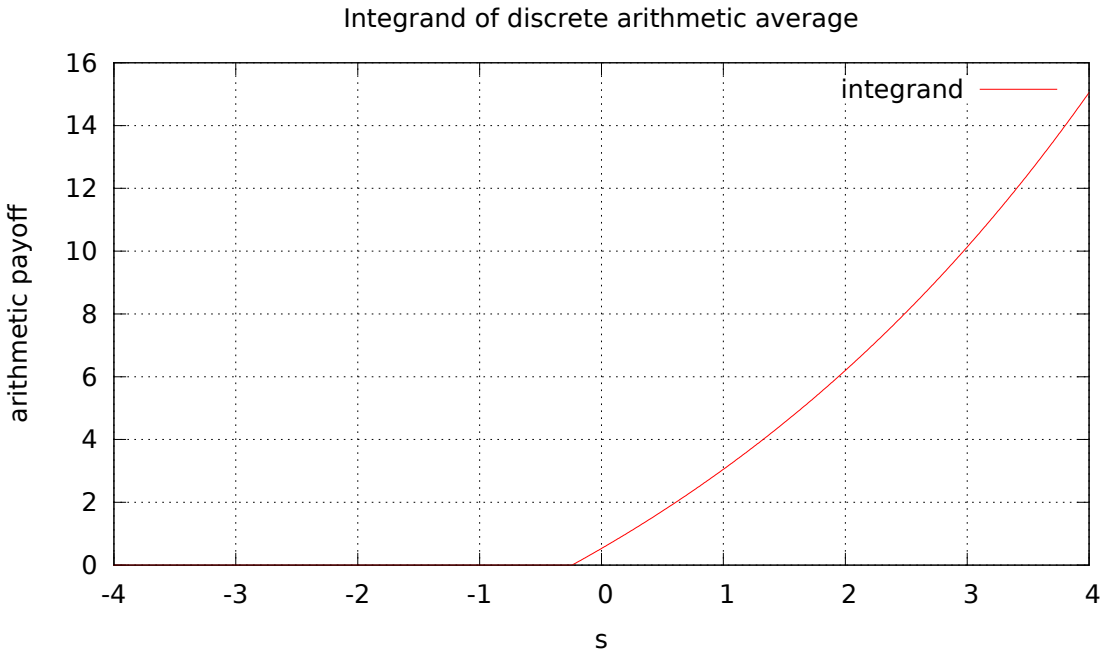
Task: 3



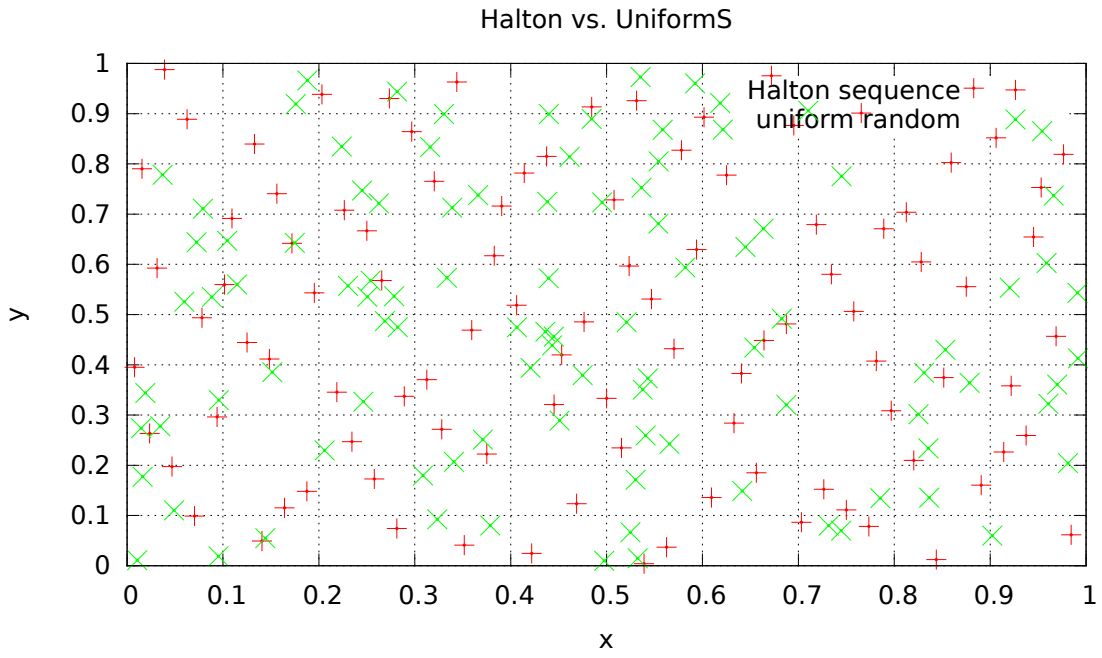
Task: 4


Relative error of discrete vs continuous geometric fair prices.
rel error
relative error
1
0.1
0.01
1
10
100
1000
10000
M

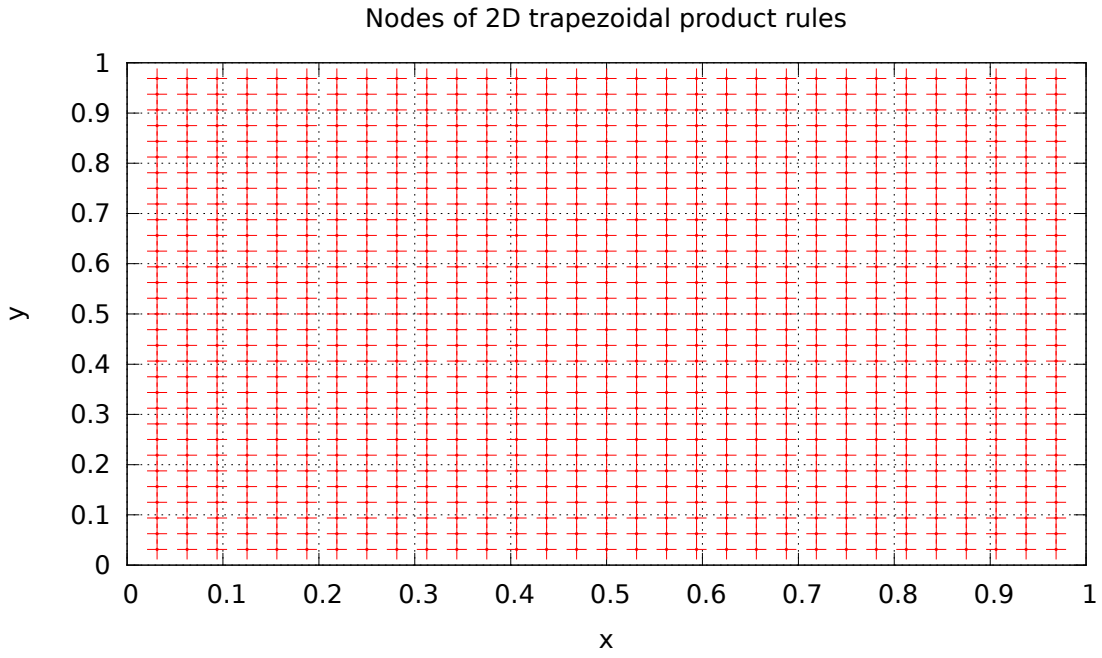
Task: 5

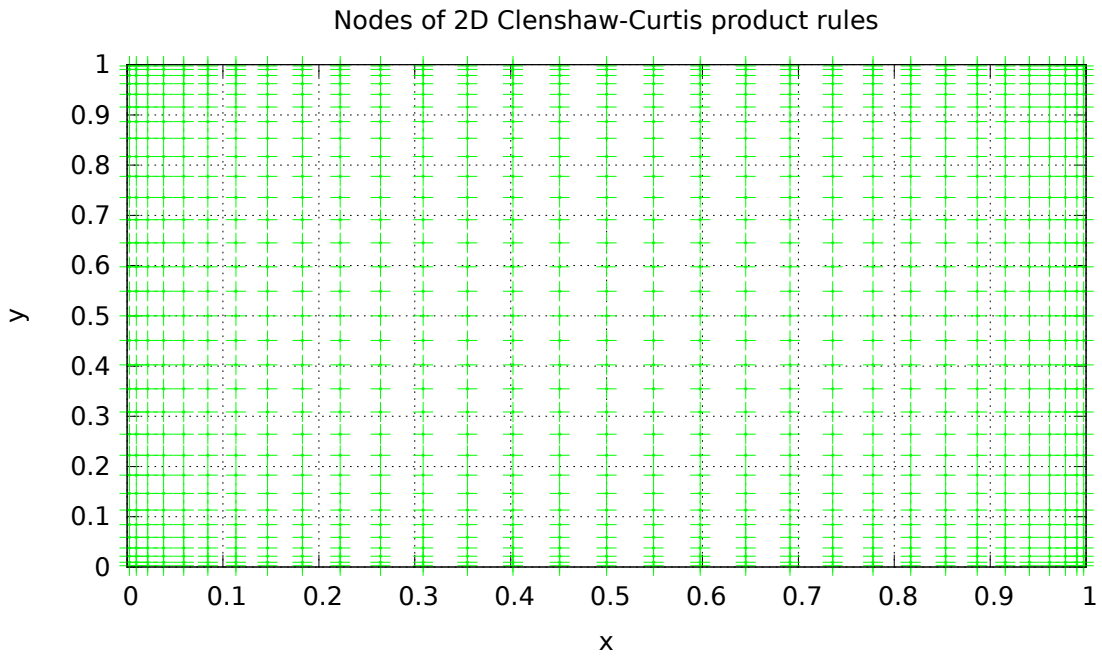

Integrand of discrete arithmetic average
integrand
arithmetic payoff
16
14
12
10
8
6
4
2
0
-4
-3
-2
-1
0
1
2
3
4
s

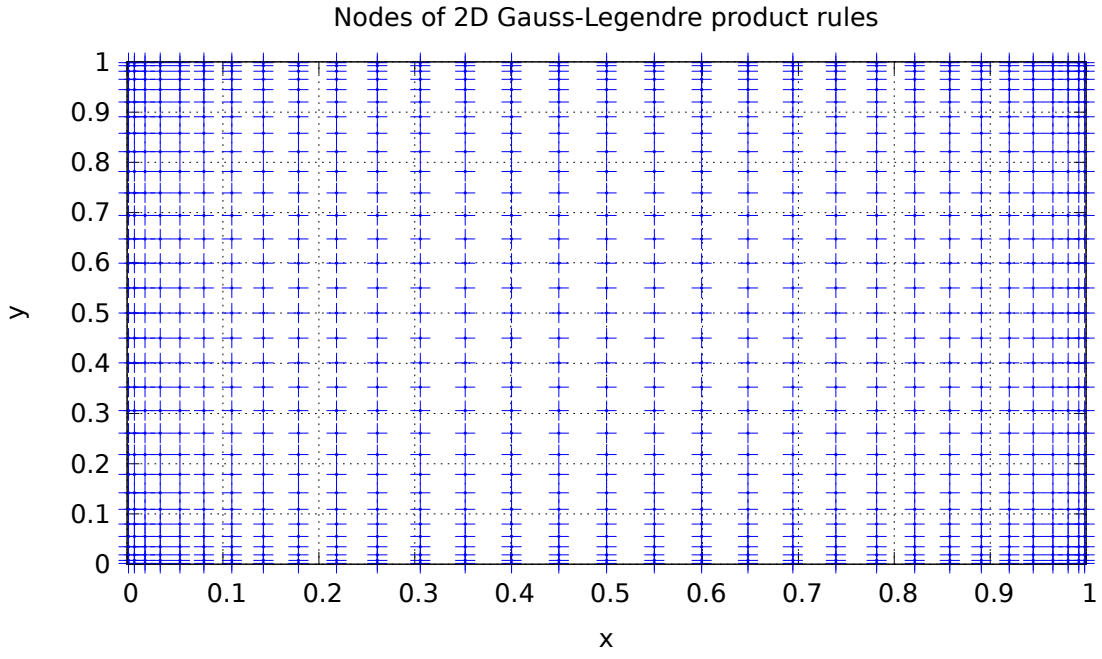
Task: 7


Halton vs. UniformS
Halton sequence
uniform random
y
x
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

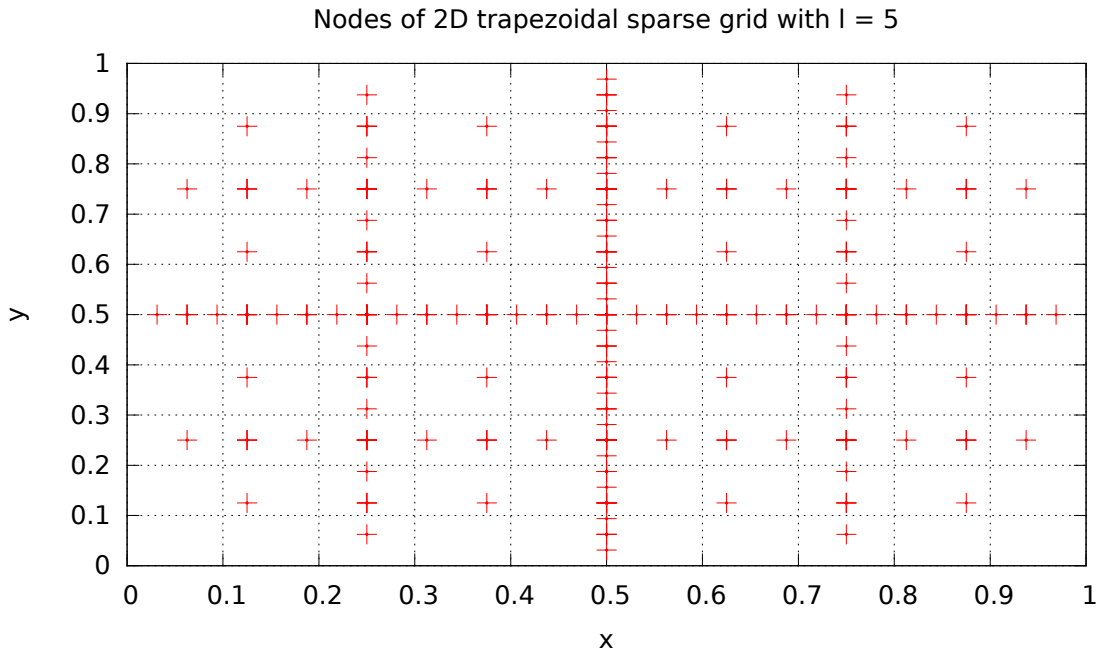
Task: 9

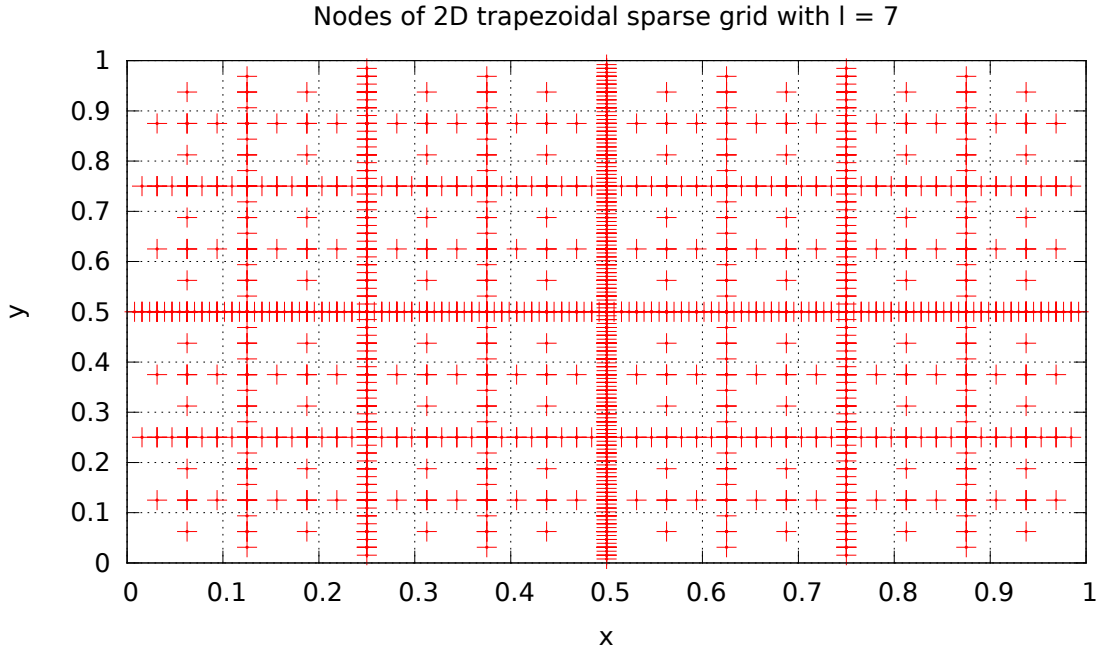

Nodes of 2D trapezoidal product rules
y
x
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

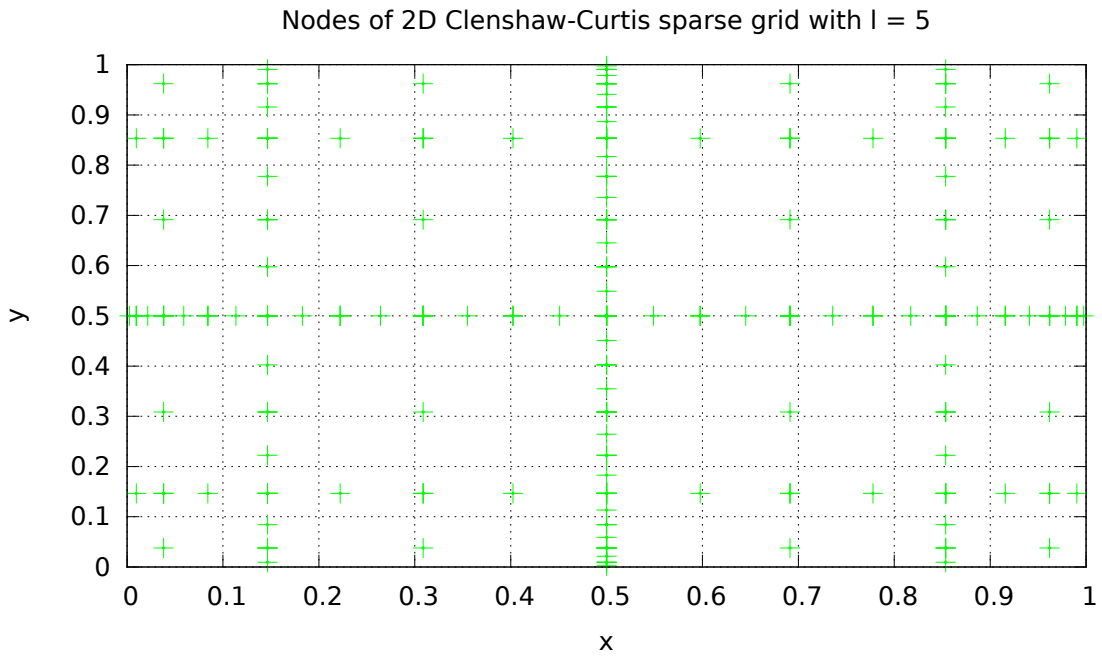

Nodes of 2D Clenshaw-Curtis product rules
y
x
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

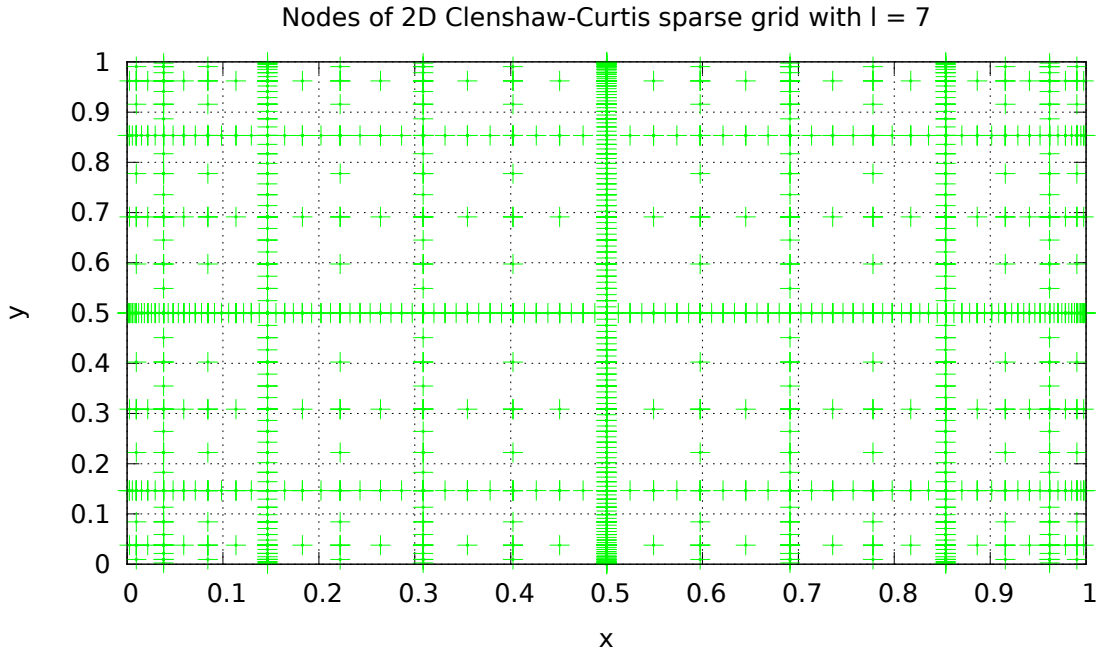

Nodes of 2D Gauss-Legendre product rules
y
x
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

Task: 11

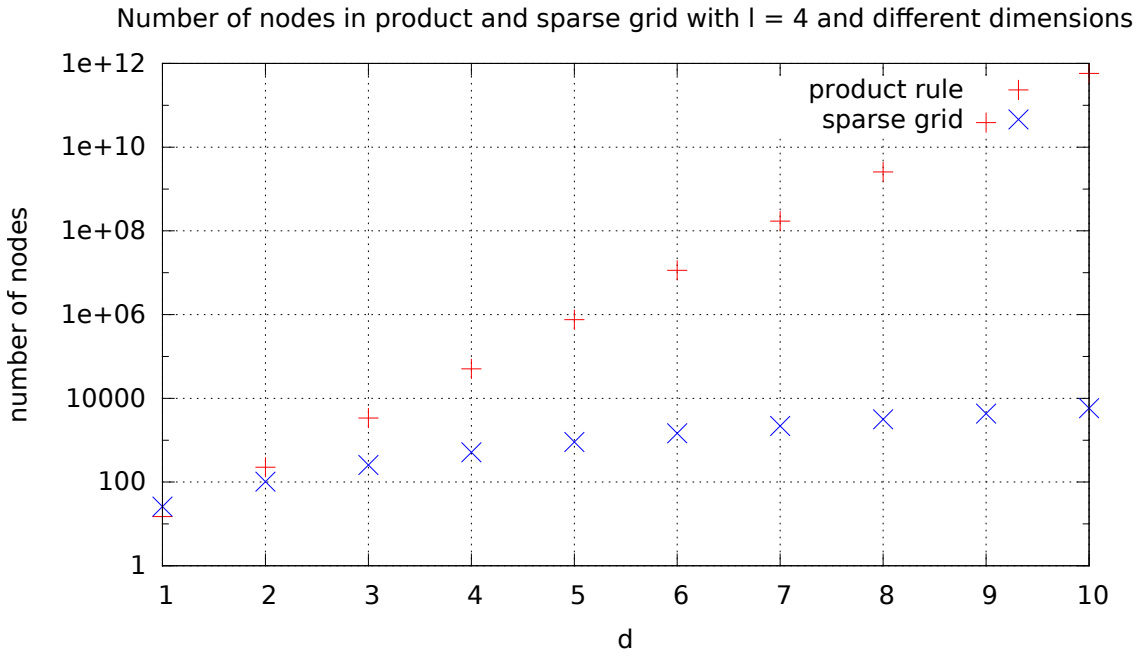

Nodes of 2D trapezoidal sparse grid with l = 5
y
x
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


Nodes of 2D trapezoidal sparse grid with l = 7
y
x
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

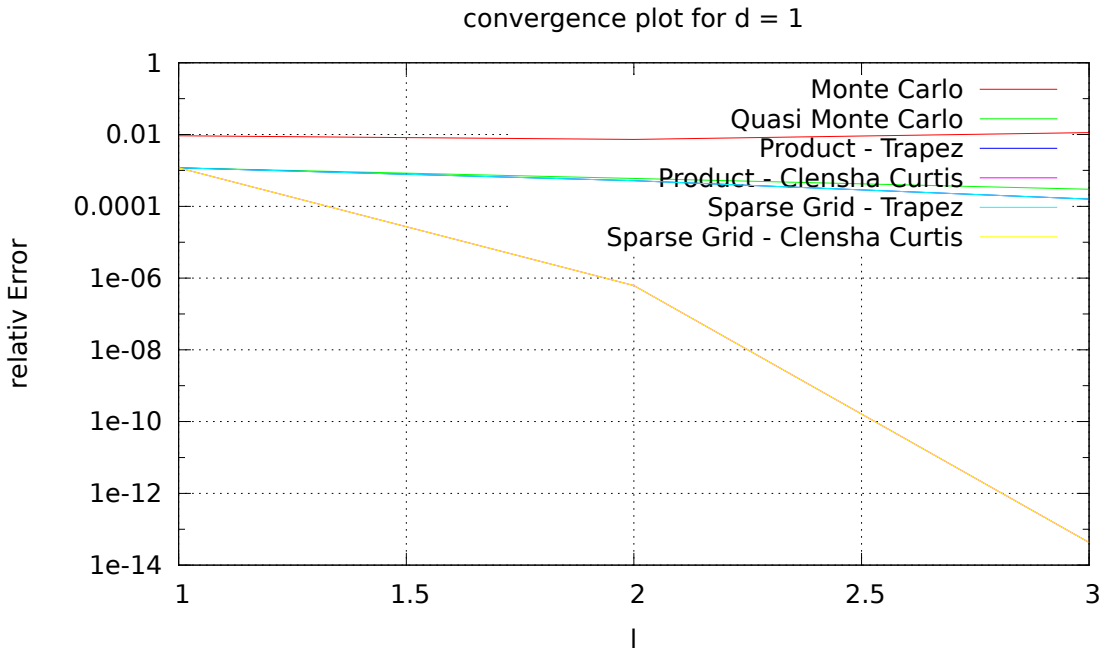

Nodes of 2D Clenshaw-Curtis sparse grid with l = 5
y
x
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

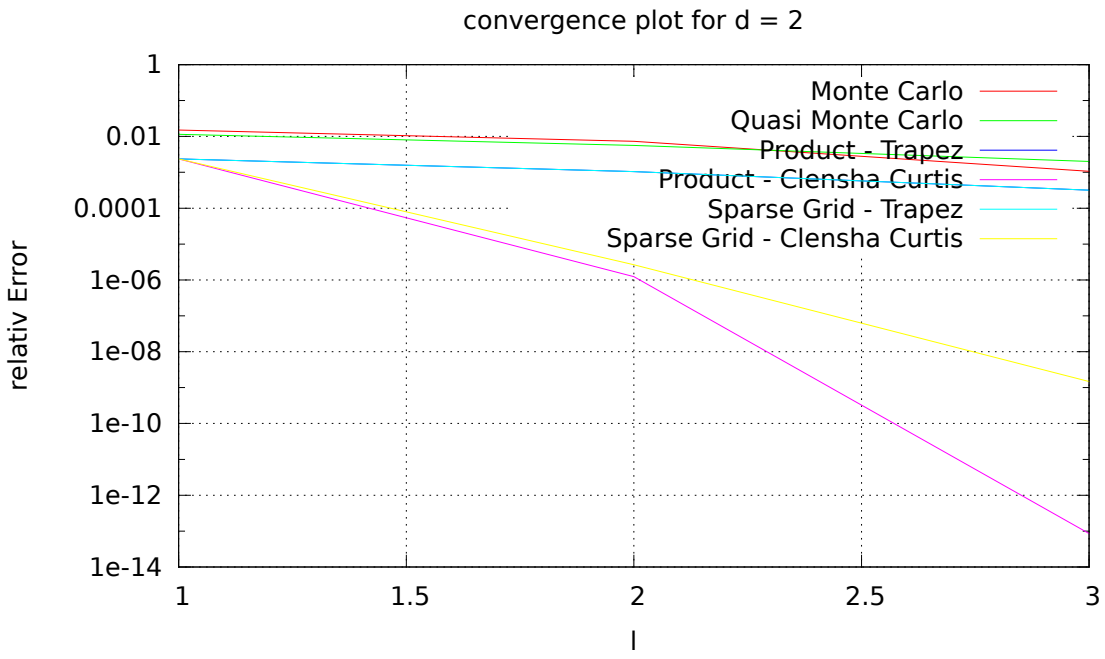

Nodes of 2D Clenshaw-Curtis sparse grid with l = 7
y
x
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

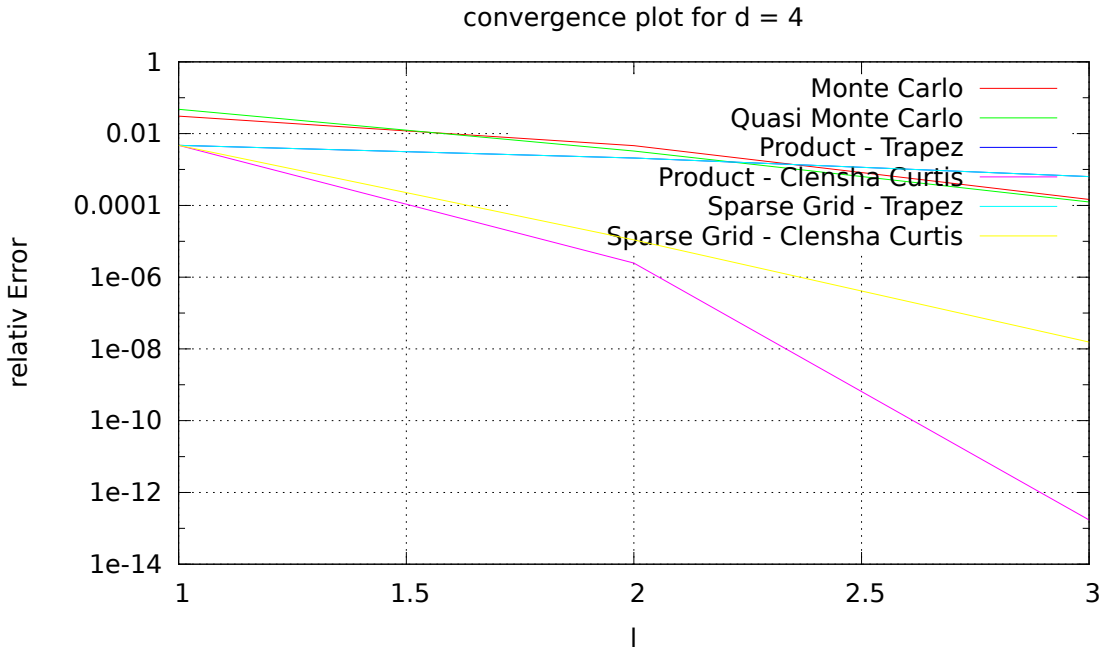
Task: 12

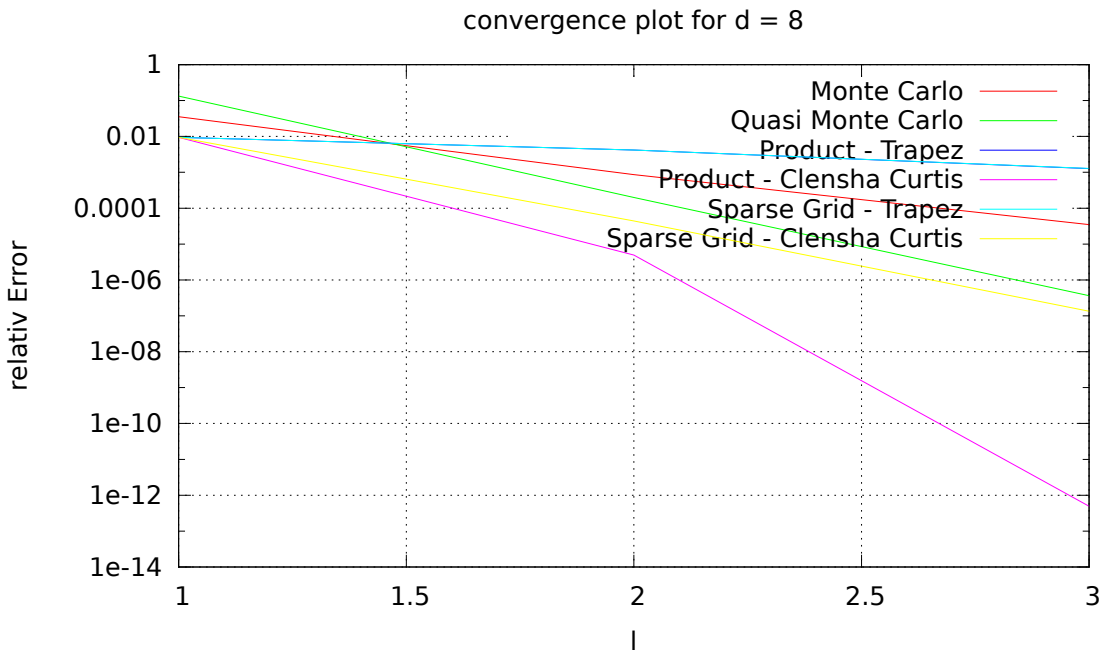


Task: 13




convergence plot for d = 2
relativ Error
1
0.01
0.0001
1e-06
1e-08
1e-10
1e-12
1e-14
1
1.5
2
2.5
3
l
Monte Carlo
Quasi Monte Carlo
Product - Trapez
Product - Clensha Curtis
Sparse Grid - Trapez
Sparse Grid - Clensha Curtis

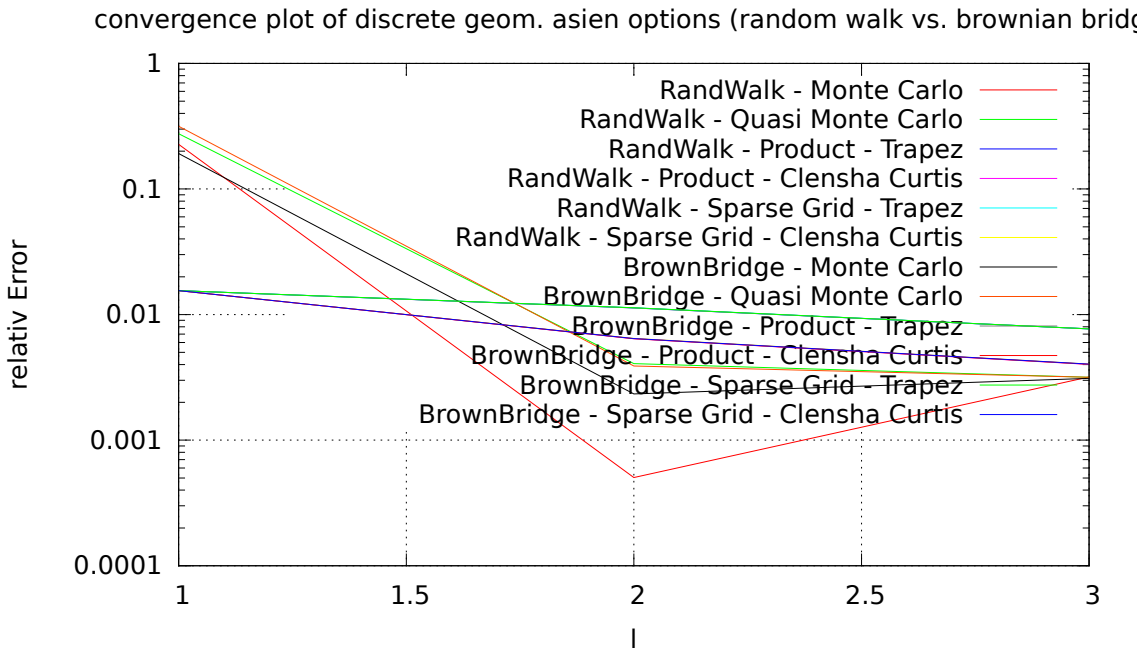

convergence plot for d = 4
relativ Error
1
0.01
0.0001
1e-06
1e-08
1e-10
1e-12
1e-14
1
1.5
2
2.5
3
l
Monte Carlo
Quasi Monte Carlo
Product - Trapez
Product - Clensha Curtis
Sparse Grid - Trapez
Sparse Grid - Clensha Curtis



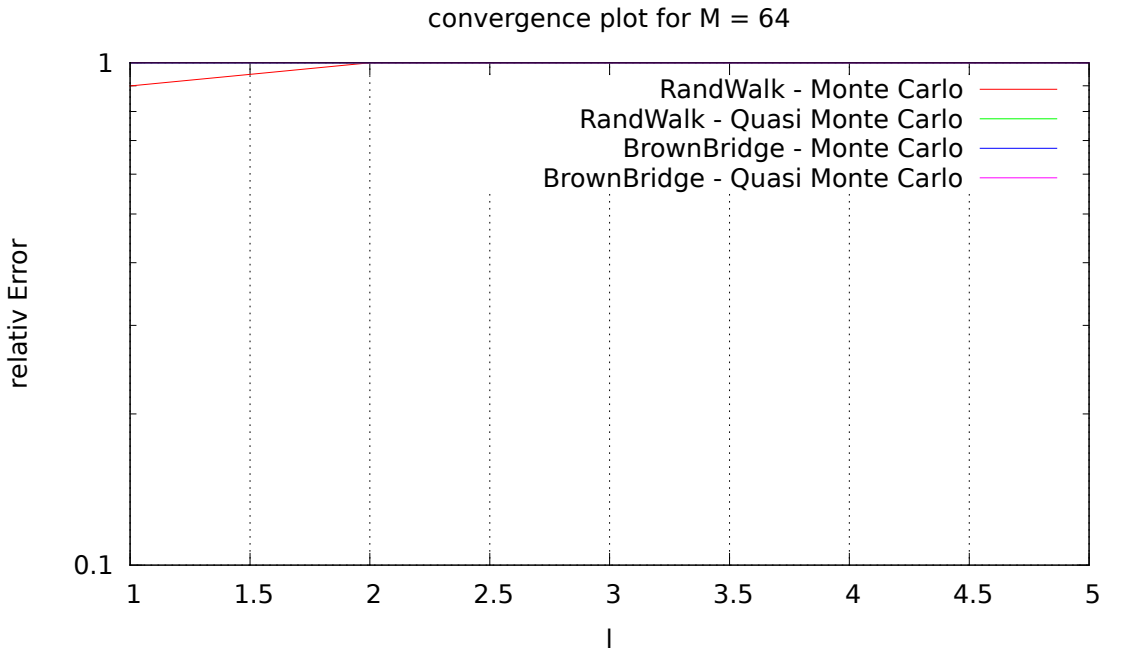
Task: 15

With level 4 and the given values the integration of both simulations is 10.4889.

Task: 16



Task: 17



Task: 18

Because of the impact of the dimension into the convergence rate, the product rule should be used for low dimensions, the sparse grid can be used for higher dimensions, then quasi Monte Carlo and for any high dimension the Monte Carlo integration method whichs convergence rate does not depend on the dimension.