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Gauss-Legendre quadrature Calculator



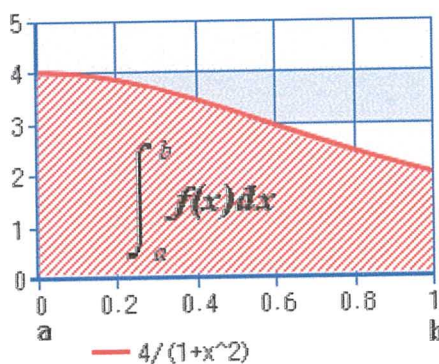
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Calculates the integral of the given function $f(x)$ over the interval (a,b) using Gauss-Legendre quadrature.

Gauss – Legendre quadrature

$$\int_{-1}^1 f(x) dx \simeq \sum_{i=1}^n w_i f(x_i)$$

$$\int_a^b f(x) dx \simeq \frac{b-a}{2} \sum_{i=1}^n w_i f\left(\frac{b-a}{2}x_i + \frac{b+a}{2}\right)$$



$f(x)$

a , b

partition n

Execute

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22digit

n

Integral



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The integrand $f(x)$ is assumed to be analytic and non-periodic.

$$\int f(x)dx \simeq \sum_{i=1}^n w_i f(x_i)$$

$$\text{nodes } x_i : P_n(x_i) = 0$$

$$\text{weights } w_i = \frac{2(1-x_i^2)}{[nP_{n-1}(x_i)]^2} = \frac{2}{[P_n^1(x_i)]^2}$$

order n n=2,3,4,...,100

Execute

Clear

Chart

Store/Read

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22digi

i	x_i	w_i
1	-0.9782286581460569928039	0.0556685671161736664828
2	-0.8870625997680952990752	0.1255803694649046246347
3	-0.7301520055740493240934	0.1862902109277342514261
4	-0.5190961292068118159257	0.2331937645919904799185
5	-0.2695431559523449723315	0.2628045445102466621807
6	0	0.2729250867779006307145
7	0.269543155952344972332	0.262804544510246662181
8	0.5190961292068118159257	0.2331937645919904799185
9	0.7301520055740493240934	0.1862902109277342514261
10	0.887062599768095299075	0.1255803694649046246347
11	0.9782286581460569928039	0.055668567116173666483

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 Nodes and Weights of Gauss-Legendre Calculator



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Calculates the nodes and weights of the Gauss-Legendre quadrature.

$$\int_{-1}^1 f(x) dx \simeq \sum_{i=1}^n w_i f(x_i)$$

nodes $x_i : P_n(x_i) = 0$

$$\text{weights } w_i = \frac{2(1-x_i^2)}{[nP_{n-1}(x_i)]^2} = \frac{2}{[P_n'(x_i)]^2}$$

order n n=2,3,4,...,100

Execute

Clear

Chart

Store/Read

Print

22digit


i	x_i	w_i
1	-0.9681602395076260898356	0.0812743883615744119719
2	-0.8360311073266357942994	0.1806481606948574040585
3	-0.6133714327005903973087	0.2606106964029354623187
4	-0.3242534234038089290385	0.312347077040002840069
5	0	0.330239355001259763165
6	0.3242534234038089290385	0.312347077040002840069
7	0.6133714327005903973087	0.260610696402935462319
8	0.8360311073266357942994	0.1806481606948574040585
9	0.9681602395076260898356	0.081274388361574411972

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 Nodes and Weights of Gauss-Kronrod Calculator



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Calculates the nodes and weights of the Gauss-Kronrod quadrature.

Gauss – Kronrod quadrature

$$\int_{-1}^1 f(x) dx \simeq \sum_{i=1}^n w_i f(x_i)$$

$$\int_a^b f(x) dx \simeq \frac{b-a}{2} \sum_{i=1}^n w_i f\left(\frac{b-a}{2} x_i + \frac{b+a}{2}\right)$$



display ☒ Kronrod x_i w_i ☐ + Gauss w_i

order n n=3,5,7,.. (odd)

Execute

Clear

Chart

Store/Read

Print

22digit

i	Kronrod x_i	Kronrod w_i
1	-0.9840853600948424644962	0.04258203675108183286451
2	-0.9061798459386639927976	0.1152333166224733940246
3	-0.7541667265708492204408	0.186800796556492657468
4	-0.5384693101056830910363	0.2410403392286475866999
5	-0.2796304131617831934135	0.272849801912558922341
6	0	0.2829874178574912132043
7	0.2796304131617831934135	0.272849801912558922341
8	0.5384693101056830910363	0.2410403392286475866999
9	0.7541667265708492204408	0.1868007965564926574678
10	0.9061798459386639927976	0.1152333166224733940246
11	0.9840853600948424644962	0.0425820367510818328645

Settings softkey

