

Gauss-Legendre Quadrature, 5 point rule

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

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

i	x_i	w_i
1	-0.90617985	0.23692689
2	-0.53846931	0.47862867
3	0.00000000	0.56888889
4	0.53846931	0.47862867
5	0.90617985	0.23692689

The Gauss-Legendre quadrature is based on the use of an optimally chosen polynomial to approximate an integrand. It has an error of order $2n$, and is exact for function $f(x)$ that are polynomials order order $2n$.

Symbol list:

- $f(x)$ The function that is integrated
- w_i Weights
- x_i Point (abscissae)
- n Number op points