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Gauss-Legendre Quadrature, 8 point rule

created by **Thijs van den Berg**

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

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

i	x_i	w_i
1	-0.96028986	0.10122854
2	-0.79666648	0.22238103
3	-0.52553241	0.31370665
4	-0.18343464	0.36268378
5	0.18343464	0.36268378
6	0.52553241	0.31370665
7	0.79666648	0.22238103
8	0.96028986	0.10122854

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