GaussLegendre Coefficients

DInt.GL

Determine if the point (x,y) is inside or outside the Polygon P

$$InPoly(P, x\#, y\#) :=$$

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I := 0
for c ∈ [1..(rows(P) − 1)]
    s := ((x# ≥ P_{c,1}) ∧ (x# > P_{c+1,1})) ∨ ((x# ≤ P_{c,1}) ∧ (x# < P_{c+1,1}))
    I := I + (s = 0) ∧ ((P_{c,2} − P_{c+1,2}) · (x# − P_{c+1,1}) > (y# − P_{c+1,2}) · (P_{c,1} − P_{c+1,1}))
mod(I, 2)
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Pseudo random number between 0 and 1

$$rnd := \left| 10^{-9} \cdot random\left(10^{9}\right) \right.$$

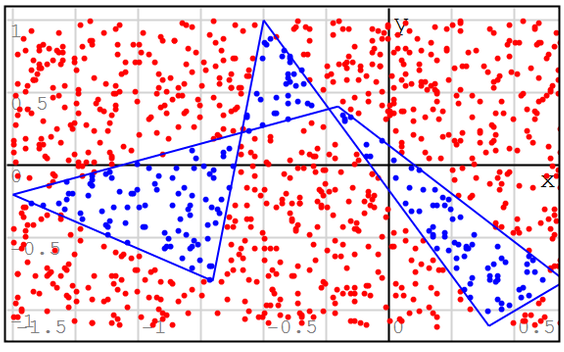
Pseudo random number between a and b

$$rnd(a, b) := \left| a + rnd \cdot (b - a) \right.$$

$$P := \begin{bmatrix} -0.5 & 1.0 \\ 0.4 & -1.1 \\ 0.7 & -0.8 \\ -0.2 & 0.4 \\ -1.5 & -0.2 \\ -0.7 & -0.8 \\ -0.5 & 1.0 \end{bmatrix}$$

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} := eval\left(\begin{bmatrix} \min(col(P, 1)) & \max(col(P, 1)) \\ \min(col(P, 2)) & \max(col(P, 2)) \end{bmatrix}\right)$$

$$r := [1..1000] \qquad X_r := rnd(a, b) \qquad Y_r := rnd(c, d)$$



$$f(x, y) := \left(x^2 + y^2\right) \cdot InPoly(P, x, y)$$

$$DInt_{GL}\left(f(x, y), a, b, c, d, GL_{50}\right) = 3.6329$$

$$\int_c^d \int_a^b f(x, y)\, dx\, dy \approx 3.6274$$

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