1c

Gaussian Legendre Quadrature - $f(x) = \frac{dx}{2-\sqrt{x}}$

$$\int_0^5 f(x)\,dx = \underbrace{\int_0^{3.99} f(x)\,dx}_{①} + \underbrace{\int_{3.99}^{4.01} f(x)\,dx}_{②} + \underbrace{\int_{4.01}^{5} f(x)\,dx}_{③}$$

$$\int_0^5 f(x)\,dx = I_1 + I_2 + I_3$$

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

for I_{1-3} over $[0, 3.99], [3.99, 4.01], [4.01, 5]$

$$I_1 \approx \frac{3.99-0}{2} \sum_{i=1}^{n} w_i f\left(\frac{3.99}{2}x_i + \frac{3.99}{2}\right)$$

$$I_2 \approx \frac{4.01-3.99}{2} \sum_{i=1}^{n} w_i f\left(\frac{0.02}{2}x_i + \frac{7.99}{2}\right)$$

$$I_3 \approx \frac{5-4.01}{2} \sum_{i=1}^{n} w_i f\left(\frac{0.99}{2}x_i + \frac{9.01}{2}\right)$$