1. Derive the one- and two-point Gaussian quadrature formulas for \( I = \int_0^1 x f(x)dx \approx \sum_{j=1}^n w_j f(x_j) \) with weight function \( W(x) = x \).

2. Use Richardson extrapolation (see the Romberg integration table) to compute \( \int_{-1}^{+1} \frac{dx}{1+x^2} \) with the number of subintervals \( n = 1, 2, 4, 8, 16, \ldots \). Compare the results \( I_1^{(1)}, I_2^{(1)}, I_4^{(1)}, I_8^{(1)} \) with your previous results on the same number of subintervals for the trapezoidal and Simpson rules. (Use the exact solution \( 2\tan^{-1} 4 \) to calculate the error of each approximation.)