

1. a) (7 points)

Write a function `numI = QGL(fname)` that approximates the integral of a function from -1 to 1 by applying the 3-point Gauss-Legendre rule. Test your MATLAB function with $f(x) = \frac{1-e^{1-x^2}}{1-e}$.

HINT: Assume that this Gauss-Legendre rule is symmetric, i.e., $x_3 = -x_1$, $x_2 = 0$ and $w_1 = w_3$.

b) (8 points)

Write a function `numI = CompQGL(fname,n)` that approximates the integral of a function from -1 to 1 by applying the 3-point Gauss-Legendre rule on n equal-length subintervals. Test the MATLAB function with the same f as in part a) and $n=10$.

HINT: Use the appropriate translation formula on page 157 for each subinterval.

c) (10 points)

Compare the results above using 10 subintervals with the results obtained applying the following to each subinterval:

- (i) left-point rule
- (ii) right-point rule
- (iii) mid-point rule
- (iv) trapezoidal rule
- (v) Simpson's rule