DEPARTMENT OF MATHEMATICS, I.I.T. GUWAHATI

MA 322: Scientific Computing Lab - IX

1. Approximate the following integrals using Gaussian quadrature with $n = 2$, and compare your results to the exact values of the integrals:

$$a. \quad \int_1^{1.5} x^2 \ln x dx \quad b. \quad \int_0^{0.35} \frac{2}{x^2 - 4} dx$$

2. Approximate the following integrals using Gaussian quadrature with $n = 2$, 3, 4, 5, uniformly spaced data points of the respective intervals:

$$a. \quad \int_0^{\pi/4} e^{3x} \sin 2x dx \quad b. \quad \int_1^{1.6} \frac{2x}{x^2 - 4} dx$$

3. Approximate $\int_{-1}^{1} e^x \sin x dx$ and $\int_{-1}^{1} e^x \cos x dx$ using Gaussian quadrature with $n = 2$ and $n = 4$.

4. Consider using Gauss-Legendre quadrature to integrate

$$a. \quad \int_0^1 e^{-x^2} dx \quad b. \quad \int_{-4}^{4} \frac{1}{1 + x^2} dx$$

with $n = 2, 4, 6$ node-point formulas.