

Econ 880: Problem Set 6

Due: 12:30 pm, 4.15.2022

Reference: Chapter 7-8 and notes

1 Integration

Evaluate $\int_0^1 x^{1/3} dx$ using (A) Trapezoid rule, (B) Gauss-Chebyshev Quadrature and (C) Gauss-Legendre quadrature. Try 3, 5 and 11 nodes with each approach. Compute the exact integral, report relative errors for each method & number of nodes, and comment on relative precision of the methods.

You have to code everything yourself here, but you can take the Gaussian quadrature nodes and weights from the table in the Judd textbook).

2 Monte-Carlo

Evaluate $\int_{[0,1]^3} e^{x+2y+3z} dx dy dz$ using (A) pseudo-random numbers from Matlab's `rand()`, (B) uniformly spaced grid. For (A), use the number of draws of the form $100n$ with $n = 1, 2, \dots, 30$. For (C), use n equally spaced nodes along each dimension with $n \geq 5$ and $n^3 \leq 3000$. Compute the true value of the integral, and plot the relative errors vs. number of integrand evaluations. Comment on precision of different methods, and ease of implementation.

You have to code everything yourself here other than obtaining the pseudo-random numbers.