Section 7.3 Extra Problem

Write MATLAB functions to implement the Trapezoid, Simpson, and Gauss-4 rules. Apply them to the integrals:

a. \[ \int_{0}^{1} e^{-x^2} \, dx = 0.74682413281242 \]

b. \[ \int_{0}^{1} x^{2.5} \, dx = \frac{2}{7} \]

c. \[ \int_{-4}^{4} \frac{1}{1+x^2} \, dx = 2 \cdot \arctan(4) \]

d. \[ \int_{0}^{2\pi} \frac{1}{2 + \cos(x)} \, dx = 3.62759872846843 \]

e. \[ \int_{0}^{\pi} e^x \cos(4x) \, dx = \frac{(e^\pi - 1)}{17} \]

with \( N \) (number of strips, \( h = (b-a)/N \)) equal to 8 and 16. For each method applied to each integral, compute an experimental order of convergence.