1. Since
\[ \int_0^1 \frac{4}{1+x^2} \, dx = \pi \]
one can compute an approximate value for \( \pi \) using numerical integration of the given function.

(a) Write two MATLAB functions which implement the trapezoidal and Simpson composite quadrature rules. Input should be: `function`, `interval`, `h`. Tabulate the approximate values for \( \pi \) for various step sizes \( h(10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}) \). Try to characterize the error as a function of \( h \) for each rule, based on the known value of \( \pi \) (`pi` in MATLAB), and also compare the accuracy of the rules with each other.

(b) Compute \( \pi \) again by using the built-in MATLAB functions `quad` and `quadv`, with various error tolerances. Compare the work required (integrand evaluations and elapsed time) with those for parts a. To measure elapsed time use `tic`, `toc` (type, `help tic` in MATLAB).

2. Implement Gaussian Quadrature Rule for \( n = 3 \) for evaluating the following integral:
\[ \int_0^1 \frac{2}{x^2 - 4} \, dx \]
using zeros of the Legendre polynomial of an appropriate degree.