Homework 1

Due January 15, 2026 on Canvas

1) Computer uses binary number to represent numbers. Use this information to write a short Matlab code to obtain the *machine precision* as accurate as possible.

2) Expand

$$f(x) = \frac{\sin(x)}{x} - 1$$

in a power series about $x = 0$. Calculate the number of terms which are necessary to insure a relative error of 10^{-7} and of 10^{-16} for any $x \in [0, 1]$.

3) Given a real number on a computer with k-digit rounding arithmetic, analytically estimate the relative error bound for the computer representation.