Math 340 • Fall 2026 • Homework #2 • Victor Matveev

Please show all your work.

Problem 1 (60pts)

Find the range of positive values of ***x*** for which the following expressions computed in double precision have no correct significant digits, i.e. relative error reaches 100% (assume that $x < 1$). You can easily double-check your answers using MATLAB, but do provide an explanation for each:

(a) $f(x) = \dfrac{\sqrt{100 + x^2} - 10}{x^2}$

(*b*) $g(x) = \dfrac{x^8}{1 - x^8} - \dfrac{x^8}{1 + x^8}$

(*c*) $h(x) = \dfrac{x^3}{x - \sin x}$

Problem 2 (20pts)

Modify functions ***f*(*x*)** and ***g*(*x*)** above so that they doesn't suffer from loss of significance for small *x.*

Problem 3 (20pts)

Convert this decimal number to a binary number, keeping only the first 10 bits after the binary point (i.e. in the fractional part): $\mathbf{119.7_{10}}$.