University of Delaware
Department of Mathematical Sciences
Math 353 Engineering Mathematics III
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Homework 1

Section §0.2

Problems #1 Convert to decimal system (base 10) the following binary numbers:

a) $(10101)_2$

b) $(0.10101)_2$

c) $(1.0110101)_2$

Problems #2 Find the binary representation of of the following decimal (base 10) numbers (Use over-bar notation if needed).

a) 227

b) 1/3

c) 55.4

Section §0.3

Problems #3 For the real number x, given in base 10, find the binary representation and the $fl(x)$ the IEEE floating point representation of x using the Rounding to the Nearest Rule.

a) $x = 2/3$

b) 44/7

Section §0.4

Problems #4 Identify for which values of x there is subtraction of nearly equal numbers (consequently loss of significance in the computer arithmetic), and find an alternative way that avoids the problem:

a) $\frac{1-(1-x)^3}{x}$

b) $\sqrt{x^2+1} - x$

c) $cos^2(x) - sin^2(x)$

Problems #5 Use MATLAB and the appropriate formulas which avoid loss of significance phenomena (see (0.13) and (0.14) Sauer's book) to solve the quadratic equation.

a) $x^2 + 3x - 8^{-14} = 0$

b) $x^2 - 1,000,000.000001x + 1 = 0$