MATH 4640 Numerical Analysis - HW 1 Solutions

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Problem 1:

Solution.   i.   a) $2^4 * 1 + 2^3 * 1 + 2^2 * 1 + 2^1 * 0 + 2^0 * 1 + 2^{-1} * 1 + 2^{-2} * 0 + 2^{-3} * 1 + 2^{-4} * 1 + 2^{-5} * 1 = 16 + 8 + 4 + 1 + 0.5 + 0.125 + 0.0625 + 0.03125 = 29.71875$

         b) $16^2 * 2 + 16^1 * 11 + 16^0 * 3 + 16^{-1} * 15 + 16^{-2} * 15 = 512 + 176 + 3 + 0.9375 + 0.05859375 = 691.99609375$

         c) $\sum_{i=1}^{n} 2^{i-1} * 1$

         d) $\sum_{i=1}^{n} 2^{-i} * 1$ ∎

   ii.   a) This is $2^5 + 2^4 + 2^2 + 2^1$ so this is 11110 in binary.

         b) This is $2^7 + 2^6 + 2^5 + 2^4 + 2^3$

         c)

Problem 2:

Solution.   a) Absolute error is

$$|10451.0023 - 10451.001| = 0.0013$$

     Relative error is

$$\frac{0.0013}{10451.0023} = .124389983 \times 10^{-6}$$

   b) Absolute error is

$$|0.451011 \times 10^4 - 0.451010 \times 10^4| = 0.01$$

     Relative error is

$$\frac{0.01}{0.451011 \times 10^4} = 0.22171 \times 10^{-5}$$

   c)

Problem 3:

Solution.   a)

   b)

Problem 4:

Solution.

Problem 5:

Solution.

Problem 6:

Solution.

Problem 7:

Solution.

Problem 8:

Solution.