Quiz 01

Oct 01, 2010.

1. How many "bits" does it take to store floating point numbers of the form $\pm 1.a_1 a_2 \cdots a_s \times 2^e$ with $s = 33$, $a_j \in \{0, 1\}$, $-511 \leq e \leq 512$?

2. Find first 15 digits of $(100002)^{\frac{1}{3}} - (100001)^{\frac{1}{3}}$. You can use any program on the computer to find the answer and then write down your answer on the answer sheet. **Note**: Direct evaluation only gives 10 correct digits. You will only get minimal credit for that.

3. Give the rate of convergence of the following limits

$$(a) : \lim_{h \to 0} \frac{\sin h}{h} \qquad (b) : \lim_{n \to \infty} \left(\ln(n+1) - \ln n \right)$$

4. Is the following algorithm stable or not? $p_0 = 1$, $p_1 = 1/3$, $p_n = \frac{10}{3} p_{n-1} - p_{n-2}$. Explain (with mathematical reasoning, not numerical observation). The true solution is $p_n^e = (\frac{1}{3})^n$.

5. Find a numerical solution of a root of $x^3 + 3x - 3 = 0$ with absolute error less than 2^{-20} using bisection method with $a_0 = 0.5$, $b_0 = 1$. **Note**: You must explain how many iterations are needed to guarantee the specified accuracy.

Numerical Analysis I, Fall 2010 (http://www.math.nthu.edu.tw/~ wangwc/)

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