

## Quiz 01

Oct 04, 2011.

1. How many bits does it take to store floating point numbers of the form  $\pm 1.a_1a_2 \cdots a_s \times 2^e$  with  $s = 11$ ,  $a_j \in \{0, 1\}$ ,  $-6 \leq e \leq 7$ ? Write down the floating number representation (a finite sequence of 0, 1) of  $-0.625$ .
2. Solve for  $x^2 - 1900x + 1 = 0$  to 15 correct digits. Explain how you find your answer (direct evaluation using 'calculator' in Windows will receive no credits).
3. Give the rate of convergence for  $\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$  either analytically or numerically.
4. Consider the following recursive equation  $p_0 = 1$ ,  $p_1 = 1/3$ ,  $p_n = \frac{10}{3}p_{n-1} - p_{n-2}$ . What is the exact solution? Is it stable? Explain.
5. At least how many points among  $f(x)$ ,  $f(x \pm h)$ ,  $f(x \pm 2h)$ ,  $f(x \pm 3h)$ ,  $\cdots$  are needed to approximate  $f'(x)$  to  $O(h^4)$ ? Explain.

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