Math 128A, Fall 2016.

Homework 2, due Sep 14th.

Prob 1. Suppose your floating-pointing arithmetic uses 4-digit decimal representations, rounds inputs to the nearest representable number, and does 'exact rounding' when performing arithmetic operations (i.e., first performing the operation exactly, then rounding).

Under these conditions, what will be the calculated 4th partial sum of the series

$$\sum_{n=1}^{\infty} \frac{1}{n^4}?$$

Assume that the addition is performed forward, from $n = 1$ to $n = 4$.

Prob 2. Same question but the addition is performed backward, from $n = 4$ to $n = 1$, using one guard digit and truncating the rest instead of 'exact rounding'.

Prob 3. Write a MATLAB routine that implements the iterative scheme

$$x_{n+1} := -\frac{c}{2b} - \frac{x_n^2}{2b}$$

with the initial value $x_0 = 0$. What stopping criterion would you use? Run it for three different pairs of coefficients c, $b \neq 0$ with your stopping criterion. Does it seem to converge? To what? Explain.

Prob 4. Suppose the univariate functions f, $g : \mathbb{R} \to \mathbb{R}$ are Lipschitz on a finite interval $[a, b]$. Prove or disprove: their product fg is also Lipschitz on $[a, b]$.