Problem 1 (6.11)**.** Prove that L^∞ is complete.

Problem 2 (6.13)**.** Let $C = C[0,1]$ be the space of all continuous functions on $[0,1]$ and define $\|f\| = \max|f(x)|$. Show that C is a Banach space.

Problem 3 (5.1)**.** Let f be the function defined

$$f(x) = \begin{cases} x\sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0. \end{cases}$$

Find $D^+f(0)$, $D_+f(0)$, $D^-f(0)$, and $D_-f(0)$.