First homework assignment in 18.101
(due Friday, Sept. 26)

(1) If $A$ is a closed bounded subset of $\mathbb{R}^n$, it’s compact. Show that this result isn’t true for metric spaces in general by doing exercise 3 in §4 of Munkres.

(2) Spivak #2–4.

(3) Munkres §6, #10.

(4) Spivak #2–37.

(5) Let $f : \mathbb{R} \to \mathbb{R}$ be the function

$$f(x) = \begin{cases} e^{-1/x}, & x > 0 \\ 0, & x \leq 0. \end{cases}$$

Prove that $f$ is $C^\infty$. (For some hints see Munkres, §16, #1 or Spivak, #2–25.)