

## Week 5, Due Fri 10/31

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1. Spivak, Chapter 5, Problem 10d, 32.
2. For a real number  $x$ , let  $\lfloor x \rfloor$  denote the largest integer  $n$  with  $x \geq n$ . Let

$$f(x) = \frac{1}{x} - \left\lfloor \frac{1}{x} \right\rfloor$$

Prove that the following limits do not exist.

- (a)  $\lim_{x \rightarrow 0} f(x)$
  - (b)  $\lim_{x \rightarrow 1} f(x)$
3. Suppose that  $f(x)$  is an increasing function, which means that if  $x > y$  then  $f(x) > f(y)$ . Suppose that  $\lim_{x \rightarrow 0} f(x)$  exists. Prove that the limit is equal to  $f(0)$ .