

Week 4, Due Fri 10/25

(This is shorter due to the midterm.)

1. Spivak, Chapter 5, Problem 26

2. Let $f(x)$ and $g(x)$ be functions with domain \mathbf{R} . Determine whether the following statements are true (and give a proof either way):

(a) If $\lim_{x \rightarrow 0} f(x)$ does not exist, and $\lim_{x \rightarrow 0} g(x)$ does not exist, then

$$\lim_{x \rightarrow 0} f(x) + g(x)$$

does not exist.

(b) If $\lim_{x \rightarrow 0} f(x)$ does not exist, and $\lim_{x \rightarrow 0} g(x)$ exists, then

$$\lim_{x \rightarrow 0} f(x) + g(x)$$

does not exist.

(c) Recall that $g \circ f(x) = g(f(x))$. If $\lim_{x \rightarrow 0} f(x)$ exists and equals zero, and $\lim_{x \rightarrow 0} g(x)$ exists, then

$$\lim_{x \rightarrow 0} g \circ f(x)$$

exists. (Be careful.)