

There are two parts to this assignment. The first part is on WeBWorK — the link is available on the course webpage. The second part consists of the questions on this page. You are expected to provide full solutions (in full sentences) with complete arguments and justifications in a linear, coherent manner. You will be graded on the correctness, clarity and elegance of your solutions. Your answers must be typed or very neatly written with all pages stapled together. Your work must be your own and must be self-contained. Assignments must be stapled, with your name and student number at the top of each page. The assignment is due at the beginning of class on the due date. Staple your assignments.

Questions:

1. We have a function such that

$$\lim_{x \rightarrow 4} f(x) = -3.$$

Justify why or why not: If x_1 is closer to 4 than x_2 , then $f(x_1)$ will be closer to -3 than $f(x_2)$.

To justify why, construct an argument why it must be true. To show why not, it suffices to provide one example where the condition is true but the conclusion is false.

2. Construct and sketch the graph of a function $g(t)$ with:

- Domain of g is all of \mathbb{R} ,
- $g(t) \neq 2$ for any value of t

as well as the following properties:

$$\begin{array}{ll} g(0) = g(4) & \lim_{t \rightarrow 0} g(t) = 2 \\ \lim_{t \rightarrow 4^-} g(t) = -1 & \lim_{t \rightarrow 4^+} g(t) = 0 \end{array}$$

For this question and the next one, ‘construct’ means to find an algebraic expression for the function. That is, want to find: $g(t) = \dots$.

3. Construct a function $f(x)$ such that it satisfies $4 \leq f(x) \leq 8$ for all values of x , along with the condition that:

$$\begin{array}{l} \lim_{x \rightarrow 0^-} f(x) \text{ Does Not Exist} \\ \lim_{x \rightarrow 0^+} f(x) \text{ Does Not Exist} \end{array}$$

A full solution will require justification as to why the two one-sided limits do not exist for your function $f(x)$.