

Math 1300-005 - Spring 2017
Introduction to Limits, Pt. I - 1/23/17



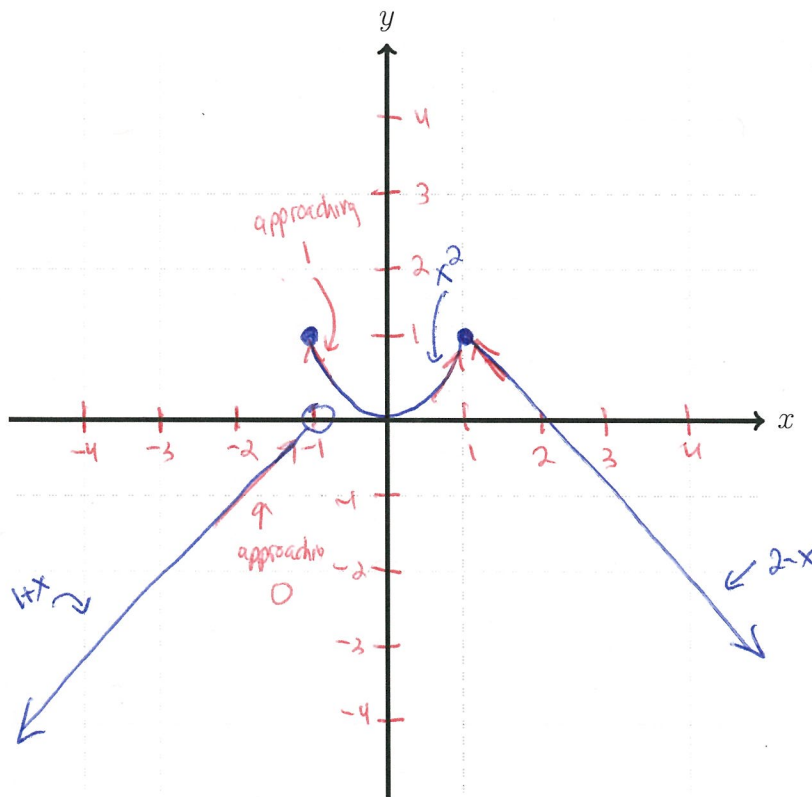
Guidelines: Please work in groups of two or three. Please show all work and clearly denote your answer.

1. Sketch the graph of the function and use it to determine the values of a for which

$$\lim_{x \rightarrow a} f(x)$$

exists. Please use interval notation for your answer.

$$f(x) = \begin{cases} 1+x & \text{if } x < -1 \\ x^2 & \text{if } -1 \leq x < 1 \\ 2-x & \text{if } x \geq 1. \end{cases}$$



At $a = -1$, $\lim_{x \rightarrow -1^-} f(x) \neq 0$ and $\lim_{x \rightarrow -1^+} f(x) = 1$.
 Since $RHL \neq LHL$, $\lim_{x \rightarrow -1} f(x)$ DNE. The limit exists
 everywhere else, so the answer is

$$(-\infty, -1) \cup (-1, \infty)$$

2. A patient receives a 150-mg injection of a drug every 4 hours. The graph below shows the amount $f(t)$ of drug in the bloodstream after t hours. Find

$$\lim_{t \rightarrow 12^-} f(t) \quad \text{and} \quad \lim_{t \rightarrow 12^+} f(t)$$

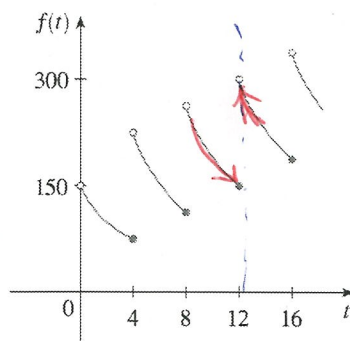
and explain the significance of these one-sided using complete sentences.

to the left
of 12, the drug
level has fallen
to 150mg

$$\lim_{t \rightarrow 12^-} f(t) = 150 \text{ mg}$$

right after
we receive
an injection so
level rises
to 300mg

$$\lim_{t \rightarrow 12^+} f(t) = 300 \text{ mg}$$

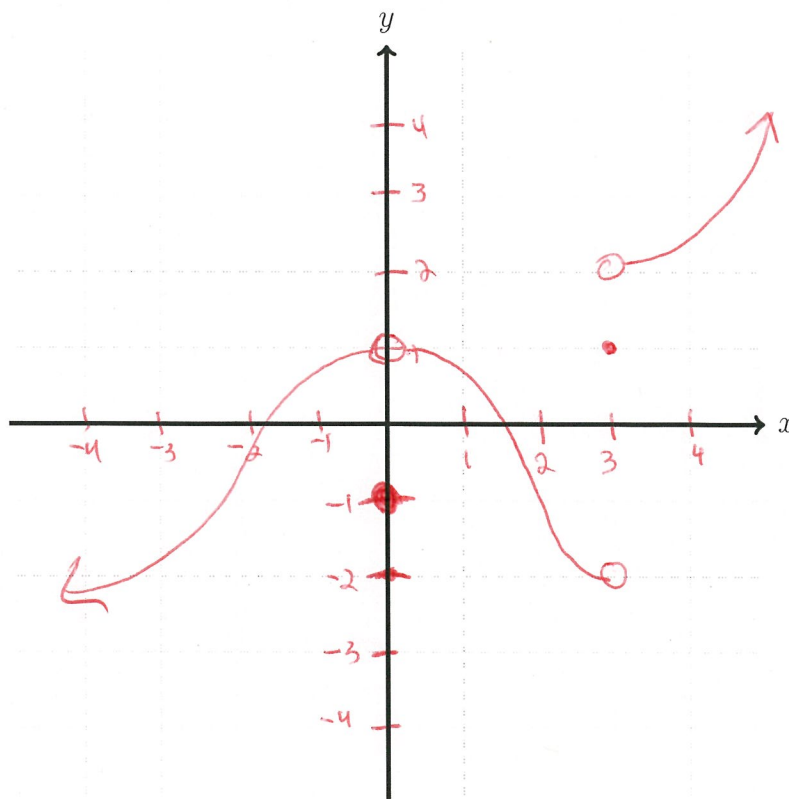


Every four hours, the patient receives an injection. As time passes, the body metabolizes the drug and its level falls until the next injection.

3. Sketch the graph of an example of a function f that satisfies

There are many
correct answers

$$\lim_{x \rightarrow 0} f(x) = 1, \quad \lim_{x \rightarrow 3^-} f(x) = -2, \quad \lim_{x \rightarrow 3^+} f(x) = 2, \\ f(0) = -1, \quad f(3) = 1.$$



Check that
all my features
are correct!