

Continuity

Requirements for Continuity:

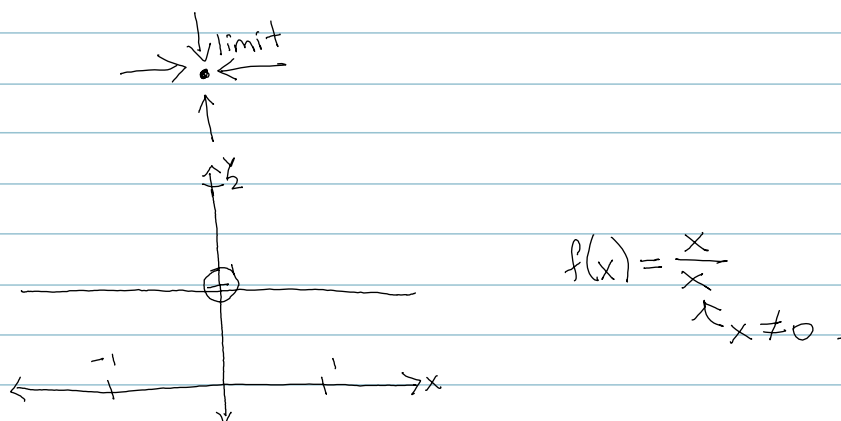
1) $\lim_{x \rightarrow a} f(x)$ exists

2) $f(a)$ is defined

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

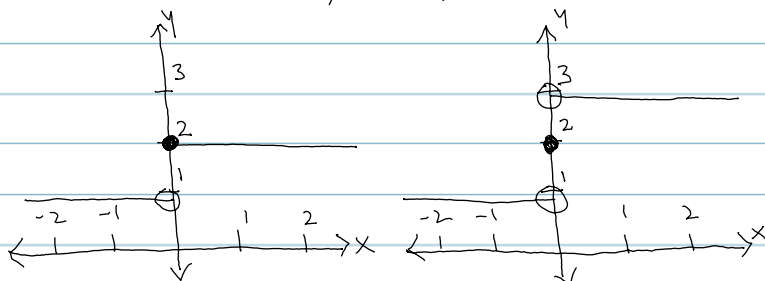
The sets of conditions given below describe functions that are discontinuous at $x=0$. For each set, give an expression for and sketch the graph of a function $f(x)$ that satisfies all the conditions.

a) $\lim_{x \rightarrow 0} f(x)$ exists, and $f(0)$ is not defined

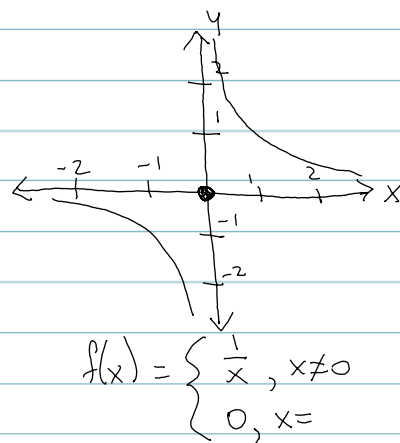


discontinuous, satisfies 1, not 2 or 3.

b) $\lim_{x \rightarrow 0} f(x)$ does not exist, and $f(0)$ is defined.



$f(x) = \begin{cases} 1, & x < 0 \\ 2, & x \geq 0 \end{cases}$ $f(x) = \begin{cases} 1, & x < 0 \\ 2, & x = 0 \\ 3, & x > 0 \end{cases}$



discontinuous, satisfy 2, not 1 or 3.

Continuity (continued)

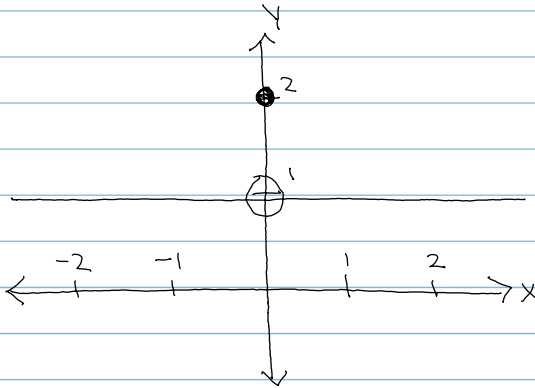
Requirements for Continuity:

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

2) $f(a)$ is defined

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

2) $\lim_{x \rightarrow 0} f(x)$ exists, $f(0)$ is defined, and $\lim_{x \rightarrow 0} f(x) \neq f(0)$



$$f(x) = \begin{cases} 1, & x \neq 0 \\ 2, & x = 0 \end{cases}$$

discontinuous, satisfies 1 & 2, not 3,