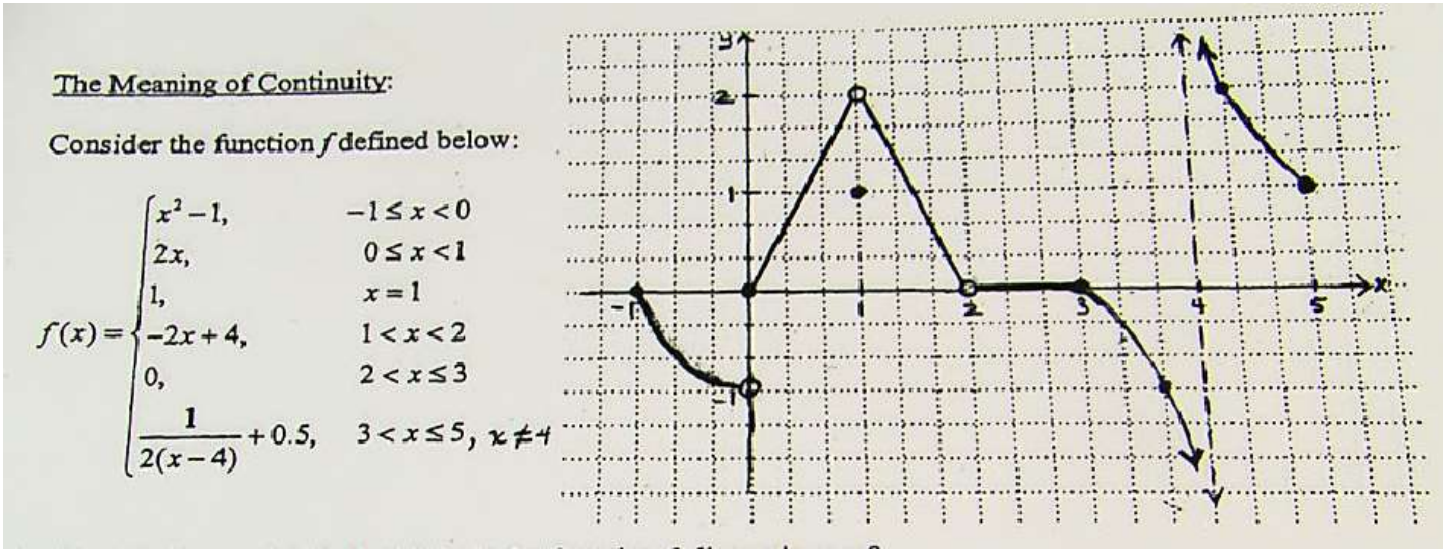
What makes a function continuous?



1. Over the interval [-1, 5], where is the function ***f*** discontinuous?

2. Complete the table for each value of x = c given.

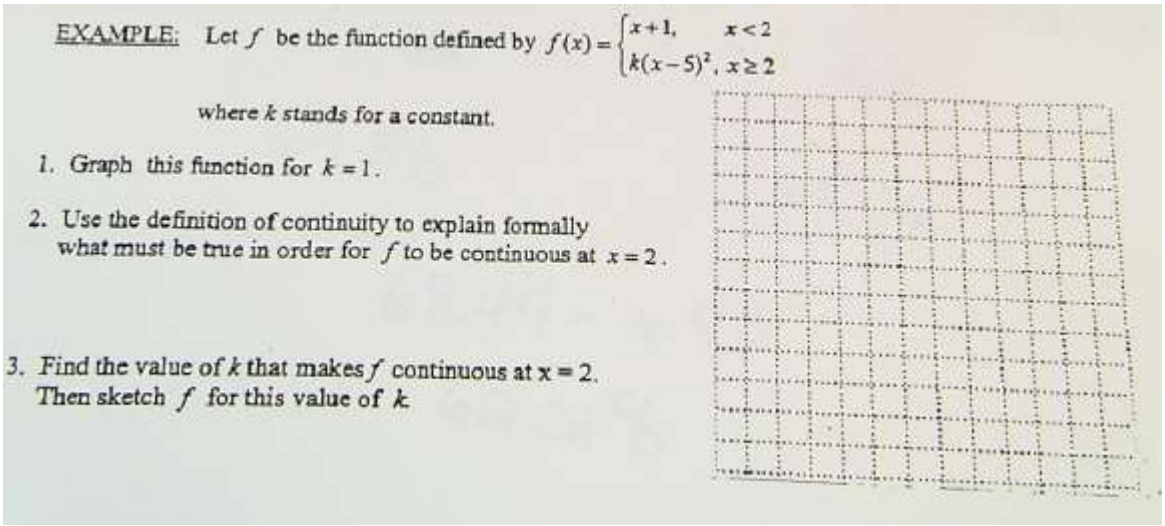
X = c	$f(c)$	$\lim_{x\to c^-} f(x)$	$\lim_{x\to c^+} f(x)$	$\lim_{x\to c} f(x)$	Does $f(c)=\lim_{x\to c} f(x)$	Is $f(x)$ continuous at x = c?
0						
1						
2						
3						
4						

Using the table above, determine the three conditions that must exist in order for a function to be continuous:

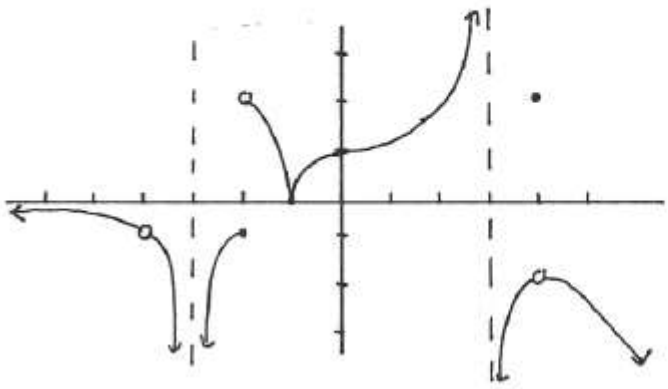
a) The $\lim_{x\to c} f(x)$ _____

b) $f(c)$ _____

c) $\lim_{x\to c} f(x)$ _____ $f(c)$



6. Use the graph below.
   a) Find all x values where the graph is discontinuous.
   b) For each discontinuous x value, name the type of discontinuity.
   c) For each discontinuous x value, state why it fails the formal definition of continuity.



7. $f(x)=\begin{cases}\dfrac{x^2+5x+6}{x^2-4}, & \text{if } x\neq\pm 2\\ -\dfrac{1}{4}, & \text{if } x=\pm 2\end{cases}$

Where is $f(x)$ discontinuous? (A) Nowhere (B) x = 2 (C) x = -2 (D) x = ± 2 (E) $\mathbb{R}$

Find the value of a and b so that $f(x)$ is continuous

8. $f(x)=\begin{cases}ax-1, & x<-1\\ -x^2+1, & -1\le x<2\\ \frac{1}{2}x+b, & x\ge 2\end{cases}$

9. $f(x)=\begin{cases}2x+a, & x\le -1\\ x^2+1, & -1<x\le 2\\ bx-1, & x>2\end{cases}$

10. $f(x)=\begin{cases}\frac{x^2+7x+10}{x+2} & \text{if } x\neq -2\\ b & \text{if } x=2\end{cases}$

Are the following continuous at x = 2? If not, give the official reason according to the formal definition of continuity.

11. $f(x)=\begin{cases}x^2 & \text{if } x\le 2\\ 3x-2 & \text{if } x>2\end{cases}$

12. $f(x)=\begin{cases}x^2 & \text{if } x<2\\ 3x-2 & \text{if } x>2\end{cases}$

13. $f(x)=\begin{cases}x^2 & \text{if } x\le 2\\ 3x+2 & \text{if } x>2\end{cases}$

14. $f(x)=\begin{cases}x^2 & \text{if } x<2\\ 5 & \text{if } x=2\\ 3x-2 & \text{if } x>2\end{cases}$