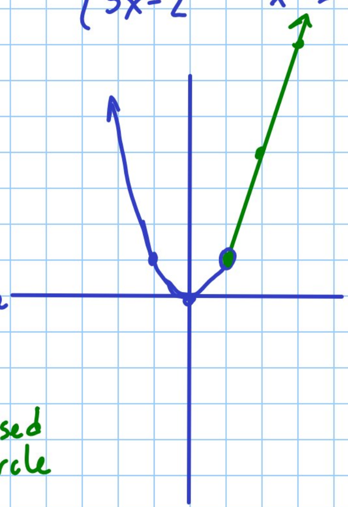
WARMUP

Graph each of the following:

1) $f(x) = \begin{cases} x^2 & x < 1 \\ 3x - 2 & x \geq 1 \end{cases}$

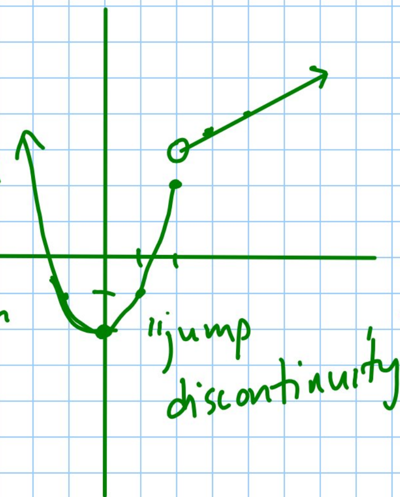
x	y	
-1	1	
0	0	
1	1	← open circle
1	1	← closed circle
2	4	
3	7	

x^2

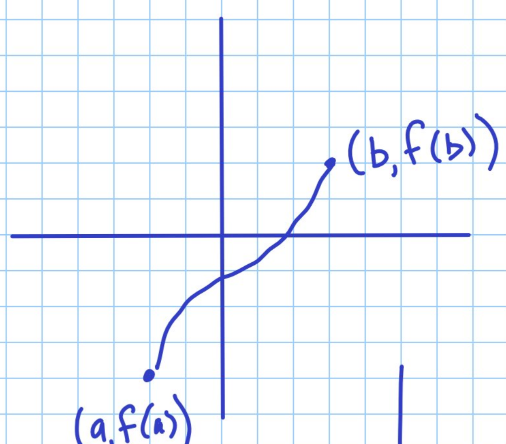


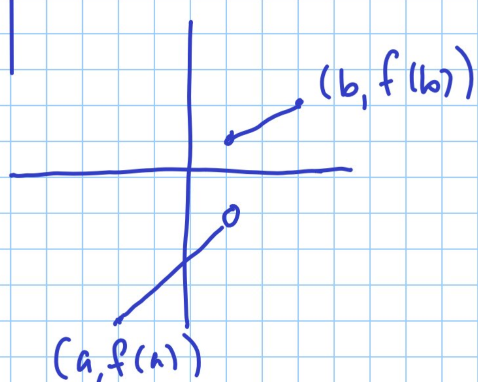
2) $f(x) = \begin{cases} x^2 - 2 & x \leq 2 \\ \frac{1}{2}x + 2 & x > 2 \end{cases}$

x	y	
0	-2	
1	-1	
2	2	← closed
2	3	← open
3	3.5	
4		



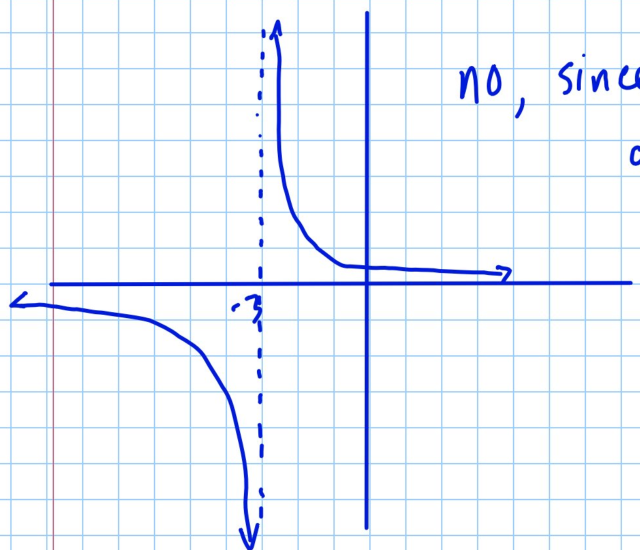
Section 1.7 Continuity





A graph is <u>continuous</u> on an interval if it has no breaks (vertical asymptotes), jumps, or holes on that interval.

ex: Is $f(x) = \frac{1}{x+3}$ continuous on the interval $[-5, 0]$?



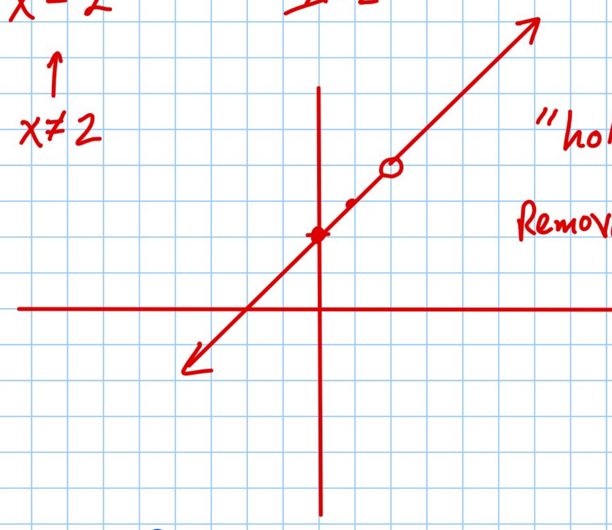
no, since it has a V.A. at $x = -3$

how about on $[-1, 6]$?
yes

Another example of a discontinuity is when the graph has a hole.

ex: $f(x) = \frac{x^2 - 4}{x - 2} = \frac{(x+2)\cancel{(x-2)}}{\cancel{x-2}} = x + 2, \ x \neq 2$

$x \neq 2$



"hole" at $x = 2$
Removable discontinuity

Some functions are continuous for all real numbers
- linear, polynomial, exponential, sines, and cosines

The function $y = \log x$ is continuous for $x > 0$

A rational function like $f(x) = \frac{x^3-27}{x+4}$ is continuous except where denominator $= 0$. So this function is continuous except when $x = -4$.

ex: Find k so that $f(x) = \begin{cases} kx^2, & x < -1 \\ -x+2, & x \geq -1 \end{cases}$

is continuous everywhere

2 graphs must meet when $x=-1$

$$k(-1)^2 = -(-1)+2$$

$$k = 3$$

p47-48
2, 3-9 odd,
13, 15

15) $f(x) = \begin{cases} \frac{5x^3-10x^2}{x-2} & x \neq 2 \\ k & x = 2 \end{cases}$

$$\frac{5x^3-10x^2}{x-2}$$

$$= \frac{5x^2\cancel{(x-2)}}{\cancel{x-2}}$$

$$5 \cdot 2^2 = k$$

$$k = 20$$