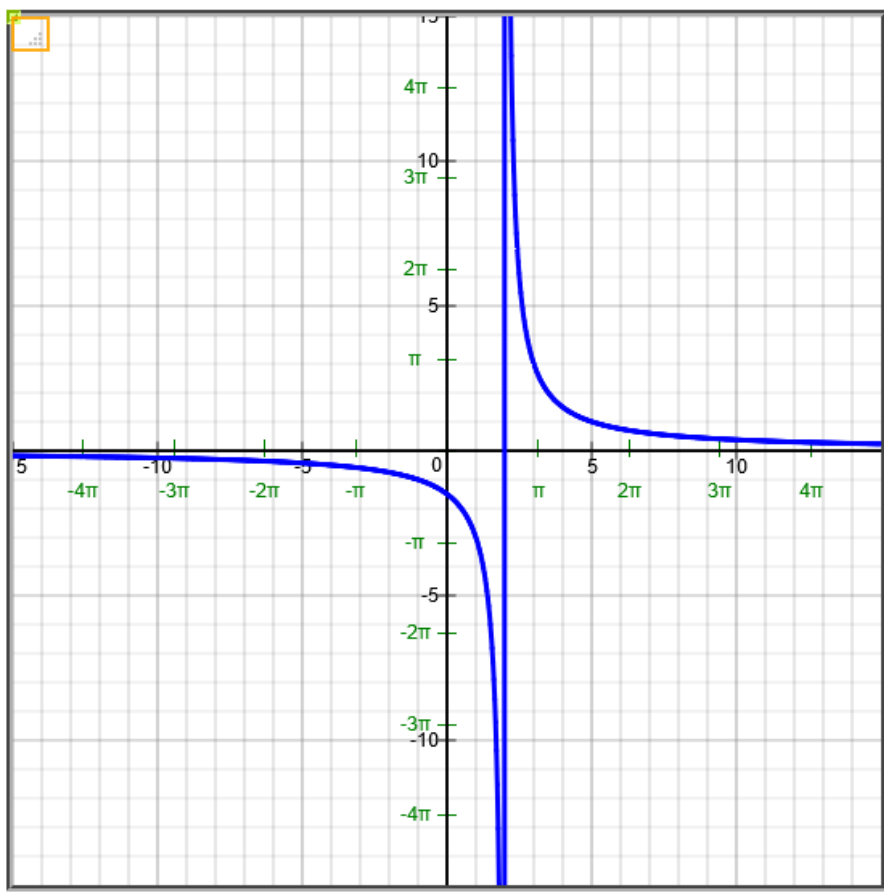


Section 1.4 Continuity

Example 1: $f(x) = \frac{3}{x-2}$

$f(x)$ is discontinuous at $x = 2$.

$f(x)$ is continuous on $(-\infty, 2) \cup (2, \infty)$

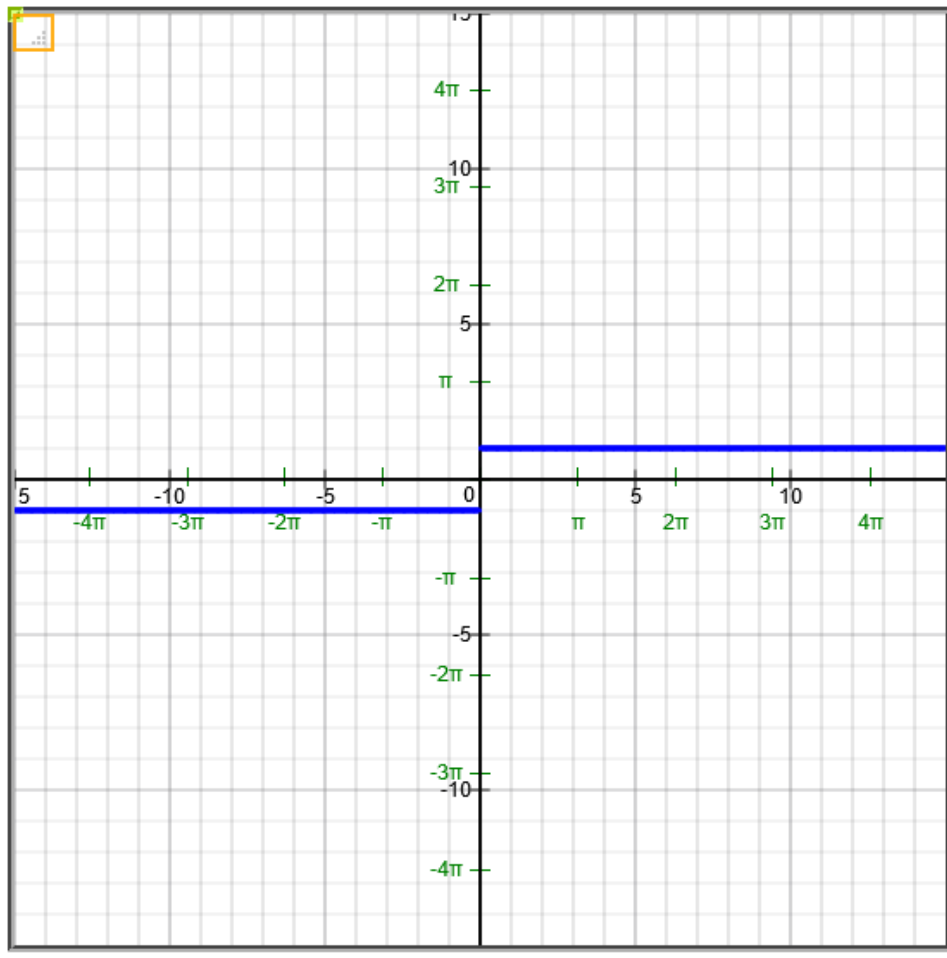


$f(x)$ has a nonremovable discontinuity
at $x = 2$

Example 2: $f(x) = \frac{|x|}{x}$

$f(x)$ is discontinuous at $x = 0$.

$f(x)$ is continuous on $(-\infty, 0) \cup (0, \infty)$

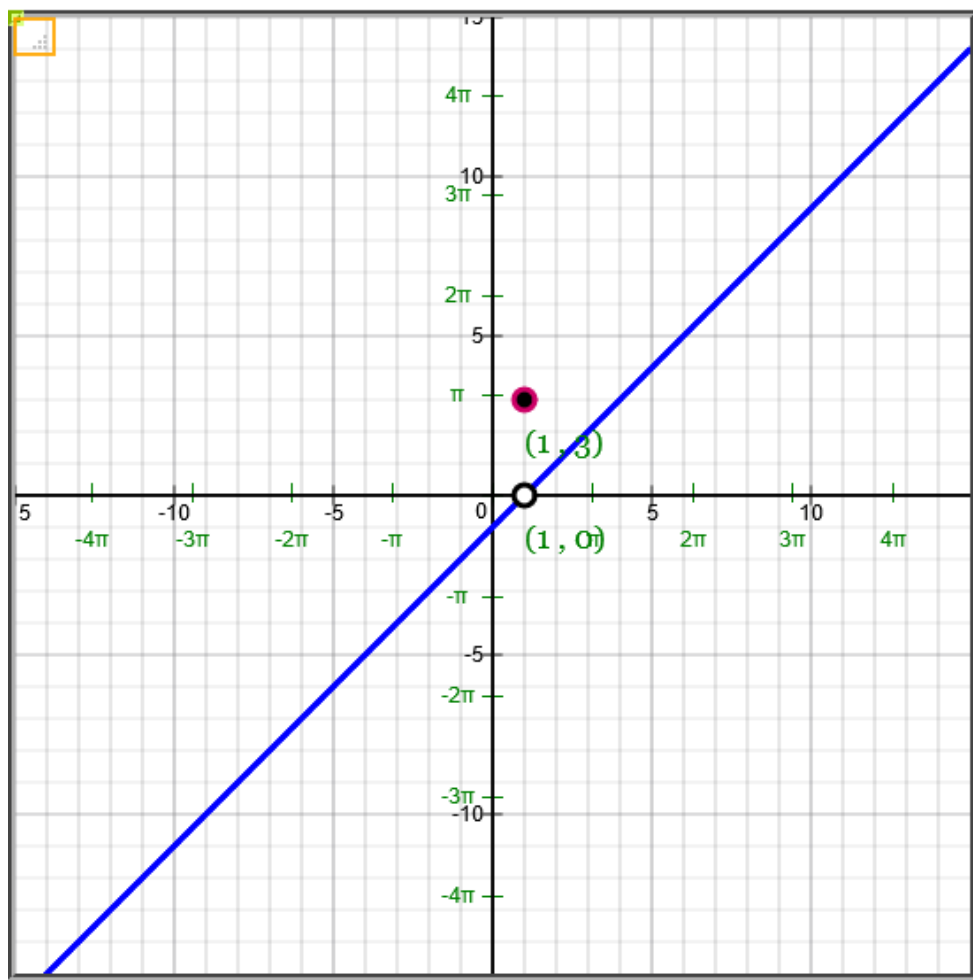


$f(x)$ has a nonremovable discontinuity at $x = 0$

Example 3: $f(x) = \begin{cases} x - 1 & \text{if } x \neq 1 \\ 3 & \text{if } x = 1 \end{cases}$

$f(x)$ is discontinuous at $x = 1$.

$f(x)$ is continuous on $(-\infty, 1) \cup (1, \infty)$



$f(x)$ has a removable discontinuity at $x = 1$

1.4 Continuity

$$f(x) = x^2 + 4$$

Is $f(x)$ continuous at $x=2$?

$$a) f(2) = (2)^2 + 4 = 8$$

$$b) \lim_{x \rightarrow 2} f(x) = (2)^2 + 4 = 8$$

Therefore, $f(x)$ is continuous at $x=2$

$$\text{because } f(2) = \lim_{x \rightarrow 2} f(x)$$

$$f(x) = \frac{1}{x+1}$$

Is $f(x)$ continuous at $x = -1$
No

$$a) f(-1) = \frac{1}{(-1)+1} = \frac{1}{0} = \text{undefined}$$

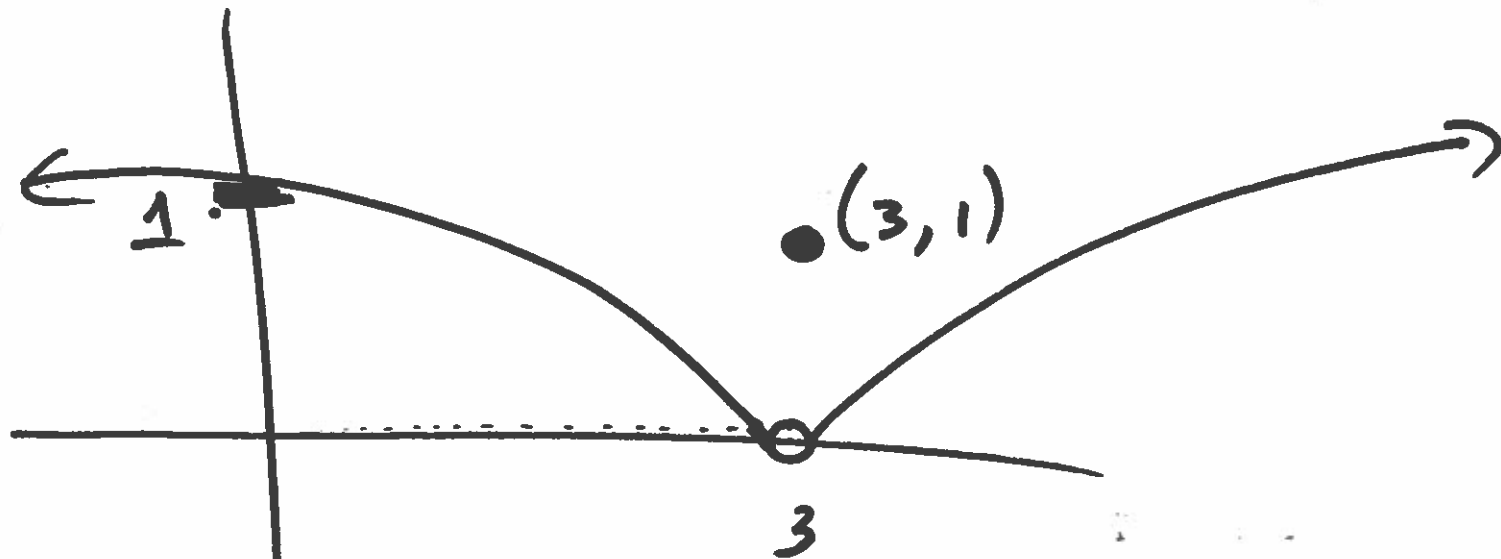
$$b) \lim_{x \rightarrow -1} f(x) = \underline{\text{DNE}}$$

$$\lim_{x \rightarrow -1^-} f(x) = \underline{? -\infty}$$

$$\lim_{x \rightarrow -1^+} f(x) = \underline{? \infty}$$

Therefore,

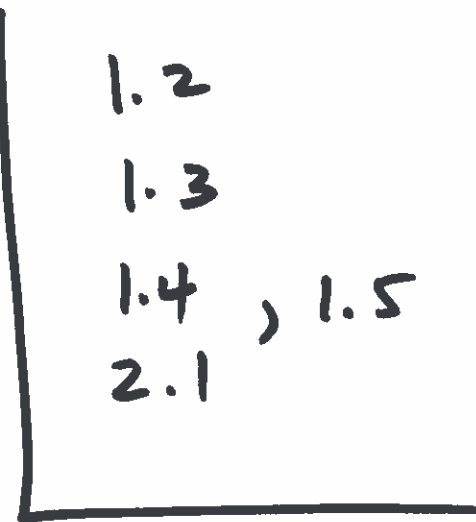
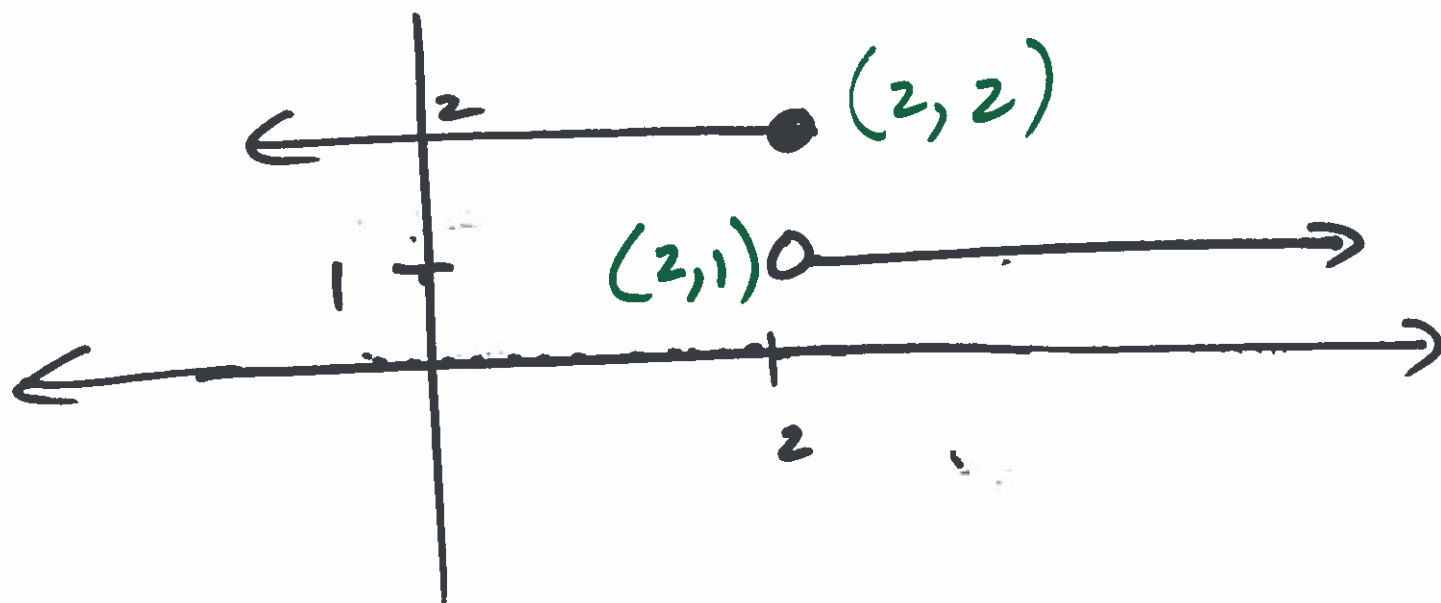
$f(x)$ is ~~not~~ not
continuous at
 $x = -1$



Is $f(x)$ continuous at $x=3$? **NO**

a) $f(3) = \underline{1}$ ($x=3, y=1$)

b) $\lim_{x \rightarrow 3} f(x) = \underline{0}$



Is $f(x)$ continuous at $x = 2$? NO

a) $f(2) = \underline{2}$ $(x=2, y=2)$

b) $\lim_{x \rightarrow 2} f(x) = \underline{? \text{ DNE}}$

$\lim_{x \rightarrow 2^-} f(x) = \underline{2}$

$\lim_{x \rightarrow 2^+} f(x) = \underline{1}$