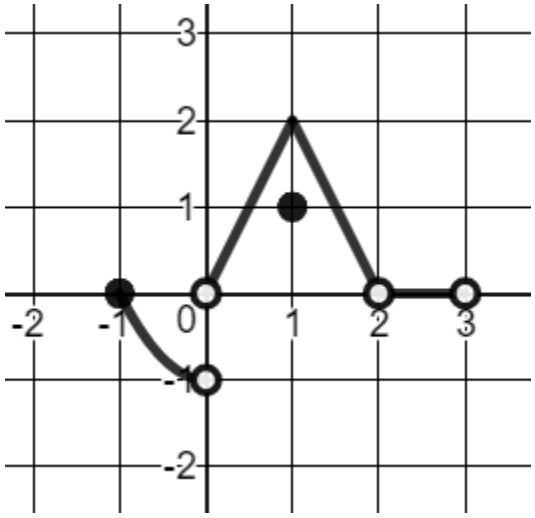
2.3 Examples

1. $y = \frac{1}{(x+2)^2} \rightarrow\rightarrow\rightarrow x = -2$ which is an asymptote. Therefore this is an infinite discontinuity.

2. $y = \tan x = \frac{\sin x}{\cos x} = \frac{\#}{0}$

a. $= \frac{\pi}{2} \pm k\pi$

3.



$$f(x) = \begin{cases} x^2 - 1, -1 < x < 0 \\ 2x, 0 < x < 1 \\ 1, x = 1 \\ -2x + 4, 1 < x < 2 \\ 0, 2 < x < 3 \end{cases}$$

a. Does f(1) exist? Yes
b. Does $\lim_{x\to 1} f(x)$ exist? Yes
c. Does $\lim_{x\to 1} f(x) = f(1)$? No
d. Is f continuous at x = 1? No

4. $f(x) = \begin{cases} 3 - x, x < 2 \\ \frac{x}{2} + 1, x > 2 \end{cases}$

a. Find the point of discontinuity—graph the function to see x = 2
b. Which is removable? Not removable because it is one-sided.

5. $f(x) = \begin{cases} 1 - x^2, x \neq 1 \\ 2, \ x = 1 \end{cases}$

a. Find the point of discontinuity—graph to see x = -1
b. Which is removable? $f(-1) = 0$

6. Give a formula for the extended formula that is continuous at the indicated point. $f(x) = \frac{x^3-1}{x^2-1}, x = 1$

a. Start by factoring: $f(x) = \frac{(x-1)(x^2+x+1)}{(x-1)(x+1)}$
b. Cancel: $f(x) = \frac{(x-1)(x^2+x+1)}{(x-1)(x+1)}$
c. Rewrite: $f(x) = \frac{(x^2+x+1)}{(x+1)}$