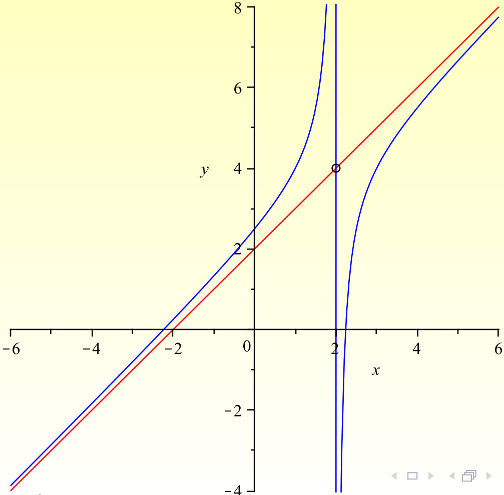
For Reading Question #1 from Monday:

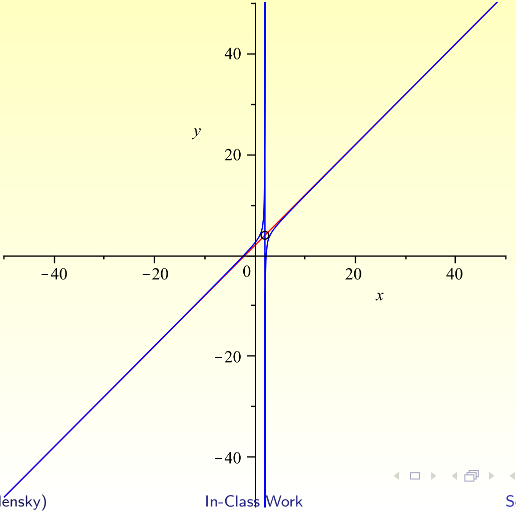
$$\frac{x^2-4}{x-2},\ \frac{x^2-5}{x-2}$$



For Reading Question #1 from Monday:

Zooming out:

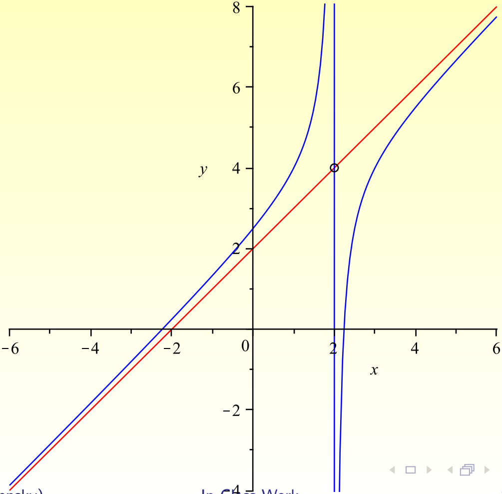
$$\frac{x^2-4}{x-2}, \frac{x^2-5}{x-2}$$



For Reading Question #1 from Monday:

Zooming back in:

$$\frac{x^2-4}{x-2}, \frac{x^2-5}{x-2}$$



For RQ # 2 from Monday: Example 1.2.2, from text

Evaluate $\lim_{x \to -3} \frac{3x+9}{x^2-9}$.

$$\begin{aligned} \lim_{x \to -3^-} \frac{3x+9}{x^2-9} &= \lim_{x \to -3^-} \frac{3(x+3)}{(x+3)(x-3)} \\ &= \lim_{x \to -3^-} \frac{3}{x-3} = -\frac{1}{2} \end{aligned}$$

Cancel factors of $(x+3)$.

For RQ # 2 from Monday: Example 1.2.2, from text

Evaluate $\lim\limits_{x\to -3} \dfrac{3x+9}{x^2-9}$.

$$\begin{aligned}\lim_{x\to -3^-} \frac{3x+9}{x^2-9} &= \lim_{x\to -3^-} \frac{3(x+3)}{(x+3)(x-3)} \qquad \text{Cancel factors of } (x+3). \\ &= \lim_{x\to -3^-} \frac{3}{x-3} = -\frac{1}{2}\end{aligned}$$

In the limit, the cancellation is legal, because x is never **equal to** -3.

For RQ # 2 from Monday: Example 1.2.2, from text

Evaluate $\lim_{x \to -3} \frac{3x+9}{x^2-9}$.

$$\begin{aligned} \lim_{x \to -3^-} \frac{3x+9}{x^2-9} &= \lim_{x \to -3^-} \frac{3(x+3)}{(x+3)(x-3)} \qquad \text{Cancel factors of } (x+3). \\ &= \lim_{x \to -3^-} \frac{3}{x-3} = -\frac{1}{2} \end{aligned}$$

In the limit, the cancellation is legal, because x is never **equal to** -3.

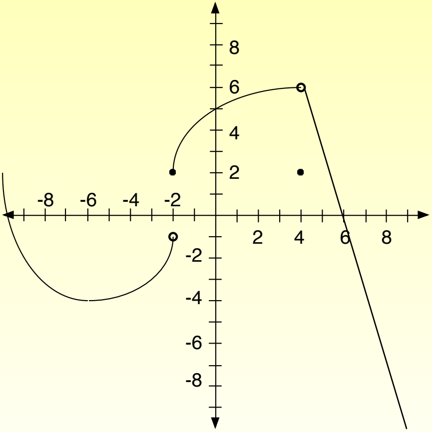
However, it is **not correct** to write

$$\frac{3(x+3)}{(x+3)(x-3)} = \frac{3}{x-3}$$

without some sort of note like when $x \neq -3$

In Class Work

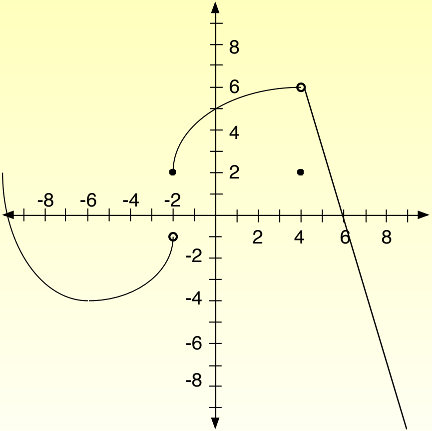
Consider the function $f(x)$ defined by the graph below. Find the following:



1. $f(4)$
2. $\lim_{x\to 4^+} f(x)$ and $\lim_{x\to 4^-} f(x)$
3. $\lim_{x\to 4} f(x)$
4. Is f continuous at $x = 4$?
5. $f(-2)$
6. $\lim_{x\to -2^+} f(x)$ and $\lim_{x\to -2^-} f(x)$
7. $\lim_{x\to -2} f(x)$
8. Is f continuous at $x = 2$?
9. $f(-6)$
10. $\lim_{x\to -6^+} f(x)$ and $\lim_{x\to -6^-} f(x)$
11. $\lim_{x\to -6} f(x)$
12. Is f continuous at $x = 6$?

Solutions to In Class Work

Consider the function $f(x)$ defined by the graph below. Find the following:



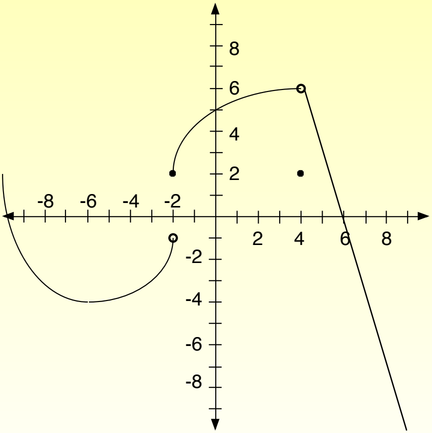
1. $f(4) = y$-value of solid circle $= 2$:
2. $\lim_{x \to 4^+} f(x) = 6$, $\lim_{x \to 4^-} f(x) = 6$.

   Remember: for limits, we do not pay any attention to what happens **at** $x = 4$.
3. $\lim_{x \to 4} f(x) = 6$, since both the left- and right-limits were 6.

   Notice: $\lim_{x \to 4} f(x) \neq f(4)$.
4. Can see f is not continuous at $x = 4$.

Solutions to In Class Work

Consider the function $f(x)$ defined by the graph below. Find the following:



5. $f(-2) = y$-value of closed circle $=$ 2

6. $\lim_{x \to -2^+} f(x) = 2$,
   $\lim_{x \to -2^-} f(x) = -1$

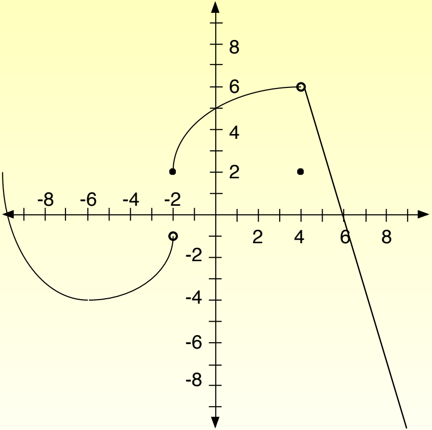
7. $\lim_{x \to -2} f(x)$ d.n.e. (does not exist), because the left- and right- sided limits differ.

   Notice: As with $x = 4$,
   $\lim_{x \to -2} f(x) \neq f(-2)$

8. Can see f isn't continuous at $x = -2$.

Solutions to In Class Work

Consider the function $f(x)$ defined by the graph below. Find the following:



9. $f(-6) = -4$
10. $\lim_{x \to -6^+} f(x) = -4$,
    $\lim_{x \to -6^-} f(x) = -4$
11. $\lim_{x \to -6} f(x) = -4$
    Notice: $\lim_{x \to -6} f(x) = f(-6)$
12. Can see f *is* continuous at $x = 6$

ESTIMATE $\lim_{x \to 0} \frac{1-\cos(x)}{x}$ **by creating a table of values of** $f(x)$**:**

From the left of $x = 0$:

x	$\frac{1-\cos(x)}{x}$
-0.1	-0.049958
-0.01	-0.005000
-0.001	-0.000500
-0.0001	-0.000050
-0.00001	-0.000005

From the right of $x = 0$:

x	$\frac{1-\cos(x)}{x}$
0.1	0.049958
0.01	0.005000
0.001	0.000500
0.0001	0.000050
0.00001	0.000005