1. Using the computations you have done in the pre-class activity as well as the Limit Laws (Theorem 1, p. 66), compute the following limits. For and justify each step of your computations.

   (a) $\lim_{x\to 1} \dfrac{x^2+x-2}{x-2}$,

   (b) $\lim_{x\to 1} \dfrac{x^2+x-2}{x-1}$,

   (c) $\lim_{h\to 0} \dfrac{\sqrt{7h+9}-3}{h}$,

   (d) $\lim_{t\to -1} \dfrac{t^2+3t+2}{t^2-1}$,

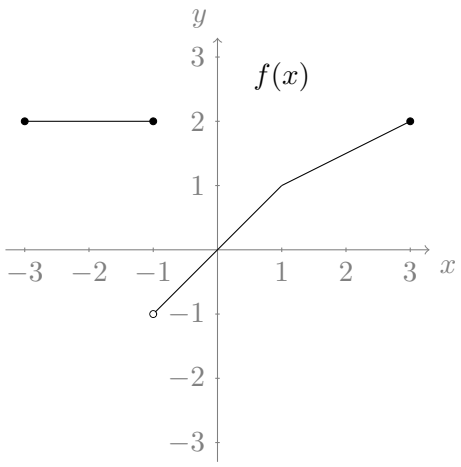
   (e) $\lim_{x\to -2} \dfrac{x+2}{\sqrt{x^2+5}-3}$,

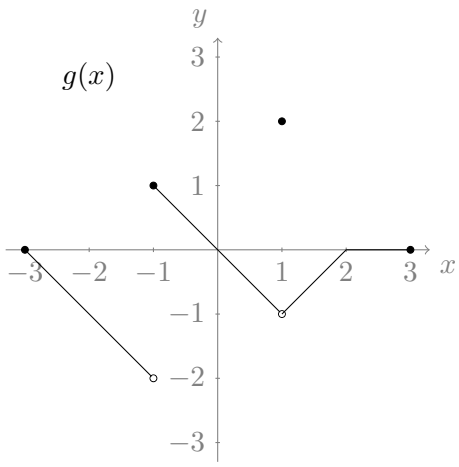
   Here point out the step where we "simplify the fractions" and explain why the whole process works (thus making the link with the pre-class activity and graphs the students drew). Also point out that we could NOT have plugged the numbers in at the very start.

OVERALL, make sure to address the following questions/topics at some point:

- *Why can we sometime just plug in the value in the limit and at other times not?*
- *What is the difference between the left-hand and right-hand limit?*
- *Make sure the students can explain in words what is happening when computing limits.*

2. Here are the graphs of the functions f and g. Compute the limits indicated below.





(a) $\lim_{x\to 1} g(x)$ *lim $g(x) \neq g(a)$*

(b) $g(1)$ *lim $g(x) \neq g(a)$*

(c) $\lim_{x\to -1} f(x)$ *DNE*

(d) $\lim_{x\to -2} \dfrac{f(x)}{g(x)}$ *the limit exists*

(e) $\lim_{x\to 1} \dfrac{f(x)}{g(x)}$ *lim $f(x)/g(x) \neq f(a)/g(a)$*

(f) $\lim_{x\to 0} \dfrac{f(x)}{g(x)}$ *lim f(x)/g(x) exists even though g(x) (and f(x)) go to 0*

(g) $\lim_{x\to 2} \dfrac{f(x)}{g(x)}$ *the left-hand limit goes to infinity and the right-hand limit is undefined*

(h) $\lim_{x\to -1} \dfrac{f(x)}{g(x)}$ *the limt exists even though the individual limits do not*

Make sure to have defined what going to infinity means for a limit.

3. Compute the following limits. If a limit does not exists because the right-hand and left-hand limits differ, evaluate them separately.

a) $\lim_{x\to 1} \dfrac{x^2+3x+2}{(x-1)^2}$ b) $\lim_{x\to 1} \dfrac{x^2+3x+2}{x-1}$

Underline that for a) the limit goes to infinity whereas for b) it depends from which side one comes.

4. Compute the following limits using the definition and/or the limit laws. Drawing the graphs of the functions may be helpful here.

   (a) $\lim_{x\to 0} \sin(1/x)$, *DNE, the graph of this function is on Worksheet 1.*

   (b) $\lim_{x\to 0} x\sin(1/x)$. *Don't let students work too long on this one.*
   Underline why the limit laws does NOT apply here.
   Use the graph of the function as a motivation for the Squeeze Theorem and then formally introduce the theorem.