Section 2.3: Calculating Limits Using Limit Laws

(1) There are five limit laws presented at the beginning of the sections. What are they? Write them in your own words.

(2) One of the limit laws has a special constraint. What is it?

(3) Read through rules 6-11. Make some notes about these rules.

(4) The main idea between all of these rules is that as long as the function is continuous, you can evaluate each of the parts separately (like splitting up the sum) or apply the limit first and then do the operation (like taking the power outside the limit). See the direct substitution property.

(5) There are several algebraic techniques to solve limits, including factoring, expanding, multiplying by the conjugate and finding a common denominator.
   (a) Give an example of a limit solved by factoring.

   (b) Give an example of a limit solved by expanding.

(c) Give an example of a limit solved by multiplying by the conjugate.

(d) Give an example of a limit solved by finding a common denominator.

(6) Sometimes, especially with piecewise functions, you find the limit by considering the two one sided limits. Explain how this works with an example.

(7) Consider $f(x) = x^2 \sin(\frac{1}{x})$. Sketch a graph of this function, x^2 and $-x^2$. (Use Desmos or GeoGebra as online graphers). Then explain algebraically why $f(x) = x^2 \sin(\frac{1}{x})$ is between x^2 and $-x^2$. Then explain how to use the squeeze theorem to find the limit.

Important ideas to know from this section:

- In the limit laws, we have to be careful when dividing that we are dividing by 0.
- The algebraic techniques of limits including direct substitution, factoring, expanding, multiplying by the conjugate and finding a common denominator will be used often. Make sure you are familar with them.

Extra Practice in Book: 2.3:1, 5, 11, 17, 21, 23, 37, 51