Solutions

Quiz 2: Concept of the Limit and Limit Laws (2.2)

1. For the function \( y = f(x) \) graphed here, find the following limits or state they do not exist.

   a. \( \lim_{x \to 2} f(x) = 0 \)

   b. \( \lim_{x \to 1} f(x) = \text{DNE} \)

   c. \( \lim_{x \to 2} f(x) = 2 \)

2. Apply the limit laws.

   Consider the following limit:
   \[
   \lim_{x \to 2} \left( 7x^2 - \frac{1}{x} \right)
   \]

   Find the value of the limit using only the limit laws and the following two limits:

   \[
   \lim_{x \to 2} x = c \quad \lim_{x \to 2} \frac{1}{x} = \frac{1}{c}
   \]

   \[
   = 7 \lim_{x \to 2} x \lim_{x \to 2} x - \frac{\lim_{x \to 2} 1}{\lim_{x \to 2} x}
   \]

   \[
   = 7(2)(2) - \frac{1}{2}
   \]

   \[
   = 28 - \frac{1}{2} = 27.5
   \]

For full credit, you might have written:

\[
= 7 \lim_{x \to 2} x \lim_{x \to 2} x - \lim_{x \to 2} \frac{1}{x}
\]

\[
= 7(2)(2) - \frac{1}{2}
\]

\[
= 27.5
\]