

Question 6

Let $f(x)$ and $g(x)$ be functions such that:

$$\lim_{x \rightarrow 2} f(x) = 5, \quad \lim_{x \rightarrow 2} g(x) = -3$$

Use limit laws to compute the following:

(a) $\lim_{x \rightarrow 2} [3f(x) - 2g(x)]$

(b) $\lim_{x \rightarrow 2} \left[\frac{f(x)}{g(x)} \right]$

Question 6 - Solution

We are given:

$$\lim_{x \rightarrow 2} f(x) = 5, \quad \lim_{x \rightarrow 2} g(x) = -3$$

(a) Use limit laws for scalar multiplication and addition/subtraction:

$$\begin{aligned} \lim_{x \rightarrow 2} [3f(x) - 2g(x)] &= 3 \cdot \lim_{x \rightarrow 2} f(x) - 2 \cdot \lim_{x \rightarrow 2} g(x) \\ &= 3(5) - 2(-3) = 15 + 6 = \boxed{21} \end{aligned}$$

(b) Use the quotient limit law:

$$\lim_{x \rightarrow 2} \left[\frac{f(x)}{g(x)} \right] = \frac{\lim_{x \rightarrow 2} f(x)}{\lim_{x \rightarrow 2} g(x)} = \frac{5}{-3} = \boxed{-\frac{5}{3}}$$