

3.6 Sum Property Of Limits

The sum of two separate limits of two separate functions $f(x)$ and $g(x)$ is the same as the limit of both functions added together.

$$\lim_{x \rightarrow a} f(x) + \lim_{x \rightarrow a} g(x) = \lim_{x \rightarrow a} [f(x) + g(x)]$$

EXAMPLE:

Show that: $\lim_{x \rightarrow 5} (x + 5) + \lim_{x \rightarrow 5} x^2 = \lim_{x \rightarrow 5} [(x + 5) + (x^2)]$.

$$\begin{aligned} \lim_{x \rightarrow 5} (x + 5) + \lim_{x \rightarrow 5} x^2 &= \lim_{x \rightarrow 5} [(x + 5) + (x^2)] \\ (5) + 5 + (5)^2 &= \lim_{x \rightarrow 5} [x^2 + x + 5] \\ 10 + 25 &= (5)^2 + (5) + 5 \\ 35 &= 35 \end{aligned}$$

3.7 Product Property Of Limits

The product of two separate limits of two functions $f(x)$ and $g(x)$ is the same as the limit of both functions multiplied together.

$$\left(\lim_{x \rightarrow a} f(x) \right) \left(\lim_{x \rightarrow a} g(x) \right) = \lim_{x \rightarrow a} [f(x) \cdot g(x)]$$

EXAMPLE:

Show that: $\lim_{x \rightarrow 5} (x + 5) \times \lim_{x \rightarrow 5} x^2 = \lim_{x \rightarrow 5} [(x + 5)(x^2)]$.

$$\begin{aligned} \lim_{x \rightarrow 5} (x + 5) \times \lim_{x \rightarrow 5} x^2 &= \lim_{x \rightarrow 5} [(x + 5)(x^2)] \\ (5) + 5 \times (5)^2 &= \lim_{x \rightarrow 5} [x^3 + 5x^2] \\ 10 \times 25 &= (5)^3 + 5(5)^2 \\ 250 &= 125 + 5(25) \\ 250 &= 125 + 125 \\ 250 &= 250 \end{aligned}$$

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