

$$1a. \lim_{x \rightarrow 1} [f(x) + g(x)]$$

$$\lim_{x \rightarrow 1} f(x) + \lim_{x \rightarrow 1} g(x)$$

$$\begin{array}{ccc} f(1) & + & g(1) \leftarrow f(x) \text{ and } g(x) \text{ are polynomial functions} \\ 2 & + & 0 \quad \text{where } 1 \text{ is in their domains. Apply direct substitution} \\ & & \text{for } 1. \end{array}$$

"
 (2)

$$\boxed{\lim_{x \rightarrow 1} [f(x) + g(x)] = 2}$$

$$1b. \lim_{x \rightarrow 1} [f(x) \cdot g(x)]$$

$$\lim_{x \rightarrow 1} f(x) \cdot \lim_{x \rightarrow 1} g(x)$$

$$\begin{array}{ccc} f(1) & \cdot & g(1) \leftarrow f(x) \text{ and } g(x) \text{ are polynomial functions} \\ 2 & \cdot & 0 \quad \text{where } 1 \text{ is in their domains. Apply direct substitution} \\ & & \text{for } 1. \end{array}$$

(0)

$$\boxed{\lim_{x \rightarrow 1} [f(x) \cdot g(x)] = 0}$$

1c. $\lim_{x \rightarrow 1} \frac{f(x)}{g(x)}$

"
 $\lim_{x \rightarrow 1} f(x)$
 $\lim_{x \rightarrow 1} g(x)$

" $\lim_{x \rightarrow 1} g(x) \rightarrow \lim_{x \rightarrow 1} g(x)$

"
 $g(1) = 0$

$\lim_{x \rightarrow 1} f(x)$

$\lim_{x \rightarrow 1} \frac{f(x)}{0}$

$\lim_{x \rightarrow 1} g(x) = 0$

Division by 0 is undefined
 causing the limit to not exist

1d. $\lim_{x \rightarrow 1} f(g(x))$

$\lim_{x \rightarrow 1} g(x)$

"
 $g(1) = 0$

$\lim_{x \rightarrow 1} f(0)$

$\lim_{x \rightarrow 1} g(x) = 0$

"
 $f(0) = 1.5$

"
 $\lim_{x \rightarrow 1} 1.5$

1.5

$\lim_{x \rightarrow 1} 1.5 = 1.5 \leftarrow \text{Constant Law}$