Properties of Limits

Suppose that the limits

$$\lim_{x \to a} f(x) \text{ and } \lim_{x \to a} g(x)$$

both exist and let c be a constant. Then,

1. $\lim_{x \to a}\left[f(x) \pm g(x) \right] = \lim_{x \to a} f(x) \pm \lim_{x \to a} g(x)$

2. $\lim_{x \to a}\left[c f(x) \right] = c \lim_{x \to a} f(x)$

3. $\lim_{x \to a}\left[f(x) g(x) \right] = \left[\lim_{x \to a} f(x) \right] \times \left[\lim_{x \to a} g(x) \right]$

4. $\lim_{x \to a}\left[\dfrac{f(x)}{g(x)} \right] = \dfrac{\lim_{x \to a} f(x)}{\lim_{x \to a} g(x)}$

5. $\lim_{x \to a}\left[f(x) \right]^{n} = \left[\lim_{x \to a} f(x) \right]^{n}$

6. $\lim_{x \to a} \sqrt{f(x)} = \sqrt{\lim_{x \to a} f(x)}$

1. If $\lim_{x \to 0} \dfrac{f(x)}{x} = 1$ and $\lim_{x \to 0} \dfrac{g(x)}{x} = 2$, evaluate each limit:

     a. $\lim_{x \to 0} f(x)$ b. $\lim_{x \to 0} g(x)$ c. $\lim_{x \to 0} \dfrac{f(x)}{g(x)}$

Answers: 1. **a.** 0   **b.** 0   **c.** $\frac{1}{2}$