

• حساب النهايات باستخدام قوانين النهايات . . Calculating Limits Using the Limit Laws

Limit Calculations

Find the limits in Exercises 1–18.

- $\lim_{x \rightarrow -7} (2x + 5)$
- $\lim_{x \rightarrow 12} (10 - 3x)$
- $\lim_{x \rightarrow 2} (-x^2 + 5x - 2)$
- $\lim_{x \rightarrow -2} (x^3 - 2x^2 + 4x + 8)$
- $\lim_{t \rightarrow 6} 8(t - 5)(t - 7)$
- $\lim_{s \rightarrow 2/3} 3s(2s - 1)$
- $\lim_{x \rightarrow 2} \frac{x + 3}{x + 6}$
- $\lim_{x \rightarrow 5} \frac{4}{x - 7}$
- $\lim_{y \rightarrow -5} \frac{y^2}{5 - y}$
- $\lim_{y \rightarrow 2} \frac{y + 2}{y^2 + 5y + 6}$
- $\lim_{x \rightarrow -1} 3(2x - 1)^2$
- $\lim_{x \rightarrow -4} (x + 3)^{1984}$
- $\lim_{y \rightarrow -3} (5 - y)^{4/3}$
- $\lim_{z \rightarrow 0} (2z - 8)^{1/3}$

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Using Limit Rules

37. Suppose $\lim_{x \rightarrow 0} f(x) = 1$ and $\lim_{x \rightarrow 0} g(x) = -5$. Name the rules in Theorem 1 that are used to accomplish steps (a), (b), and (c) of the following calculation.

$$\lim_{x \rightarrow 0} \frac{2f(x) - g(x)}{(f(x) + 7)^{2/3}} = \frac{\lim_{x \rightarrow 0} (2f(x) - g(x))}{\lim_{x \rightarrow 0} (f(x) + 7)^{2/3}} \quad (\text{a})$$

$$= \frac{\lim_{x \rightarrow 0} 2f(x) - \lim_{x \rightarrow 0} g(x)}{\left(\lim_{x \rightarrow 0} (f(x) + 7)\right)^{2/3}} \quad (\text{b})$$

$$= \frac{2 \lim_{x \rightarrow 0} f(x) - \lim_{x \rightarrow 0} g(x)}{\left(\lim_{x \rightarrow 0} f(x) + \lim_{x \rightarrow 0} 7\right)^{2/3}} \quad (\text{c})$$

$$= \frac{(2)(1) - (-5)}{(1 + 7)^{2/3}} = \frac{7}{4}$$

39. Suppose $\lim_{x \rightarrow c} f(x) = 5$ and $\lim_{x \rightarrow c} g(x) = -2$. Find

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

b. $\lim_{x \rightarrow c} 2f(x)g(x)$

c. $\lim_{x \rightarrow c} (f(x) + 3g(x))$

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

40. Suppose $\lim_{x \rightarrow 4} f(x) = 0$ and $\lim_{x \rightarrow 4} g(x) = -3$. Find

a. $\lim_{x \rightarrow 4} (g(x) + 3)$

b. $\lim_{x \rightarrow 4} xf(x)$

c. $\lim_{x \rightarrow 4} (g(x))^2$

d. $\lim_{x \rightarrow 4} \frac{g(x)}{f(x) - 1}$

41. Suppose $\lim_{x \rightarrow b} f(x) = 7$ and $\lim_{x \rightarrow b} g(x) = -3$. Find

a. $\lim_{x \rightarrow b} (f(x) + g(x))$

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

c. $\lim_{x \rightarrow b} 4g(x)$

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

42. Suppose that $\lim_{x \rightarrow -2} p(x) = 4$, $\lim_{x \rightarrow -2} r(x) = 0$, and $\lim_{x \rightarrow -2} s(x) = -3$. Find

a. $\lim_{x \rightarrow -2} (p(x) + r(x) + s(x))$

b. $\lim_{x \rightarrow -2} p(x) \cdot r(x) \cdot s(x)$

c. $\lim_{x \rightarrow -2} (-4p(x) + 5r(x))/s(x)$