

2.3 Group Activity Problems



17. Suppose p and q are polynomials. If $\lim_{x \rightarrow 0} \frac{p(x)}{q(x)} = 10$ and $q(0) = 2$, find $p(0)$.

32.
$$\lim_{h \rightarrow 0} \frac{100}{(10h - 1)^{11} + 2}$$

37.
$$\lim_{x \rightarrow b} \frac{(x - b)^{50} - x + b}{x - b}$$

44.
$$\lim_{t \rightarrow 3} \left(\left(4t - \frac{2}{t - 3} \right) (6 + t - t^2) \right)$$

59.
$$\lim_{x \rightarrow 0} x \cos x$$

64. $\lim_{w \rightarrow 3^-} \frac{|w - 3|}{w^2 - 7w + 12}$

74. **One-sided limits** Let

$$f(x) = \begin{cases} 0 & \text{if } x \leq -5 \\ \sqrt{25 - x^2} & \text{if } -5 < x < 5 \\ 3x & \text{if } x \geq 5. \end{cases}$$

Compute the following limits or state that they do not exist.

a. $\lim_{x \rightarrow -5^-} f(x)$ b. $\lim_{x \rightarrow -5^+} f(x)$ c. $\lim_{x \rightarrow -5} f(x)$
d. $\lim_{x \rightarrow 5^-} f(x)$ e. $\lim_{x \rightarrow 5^+} f(x)$ f. $\lim_{x \rightarrow 5} f(x)$

89. **Finding a constant** Suppose

$$g(x) = \begin{cases} x^2 - 5x & \text{if } x \leq -1 \\ ax^3 - 7 & \text{if } x > -1. \end{cases}$$

Determine a value of the constant a for which $\lim_{x \rightarrow -1} g(x)$ exists and state the value of the limit, if possible.

3.5 Group Activity Problems

Practice Exercises

11–22. Trigonometric limits Use Theorem 3.10 to evaluate the following limits.

14. $\lim_{x \rightarrow 0} \frac{\sin 3x}{\tan 4x}$

16. $\lim_{\theta \rightarrow 0} \frac{\cos^2 \theta - 1}{\theta}$

18. $\lim_{\theta \rightarrow 0} \frac{\sec \theta - 1}{\theta}$

20. $\lim_{x \rightarrow -3} \frac{\sin(x + 3)}{x^2 + 8x + 15}$

21. $\lim_{x \rightarrow 0} \frac{\sin ax}{\sin bx}$, where a and b are constants with $b \neq 0$

22. $\lim_{x \rightarrow 0} \frac{\sin ax}{bx}$, where a and b are constants with $b \neq 0$