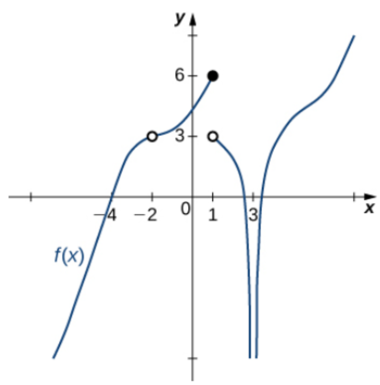
1. Use the graph of $f(x)$ in the following figure to determine each of the following values:

   (a) $\lim_{x\to-4^-} f(x)$; $\lim_{x\to-4^+} f(x)$; $\lim_{x\to-4} f(x)$; $f(-4)$

   (b) $\lim_{x\to-2^-} f(x)$; $\lim_{x\to-2^+} f(x)$; $\lim_{x\to-2} f(x)$; $f(-2)$

   (c) $\lim_{x\to1^-} f(x)$; $\lim_{x\to1^+} f(x)$; $\lim_{x\to1} f(x)$; $f(1)$

   (d) $\lim_{x\to3^-} f(x)$; $\lim_{x\to3^+} f(x)$; $\lim_{x\to3} f(x)$; $f(3)$



2. Evaluate each of the following limits:

   (a) $\lim_{x\to5^+} \dfrac{x+1}{x-5}$

   (b) $\lim_{x\to5^-} \dfrac{x+1}{x-5}$

   (c) $\lim_{x\to2^-} \dfrac{x^2-2x}{x^2-4x+4}$

3. Find the vertical asymptotes of the function $y = \dfrac{x^2+1}{3x-2x^2}$.

4. Graph $f(x) = \begin{cases} -x-2 & \text{if } x < -1 \\ 2 & \text{if } x = -1 \\ x^3 & \text{if } x > -1 \end{cases}$ and evaluate $\lim_{x \to -1^-} f(x)$.

5. Evaluate the limit, or show it does not exist.

   (a) $\lim_{x \to 5} \dfrac{x^2 - 6x + 5}{x - 5}$

   (b) $\lim_{t \to 0} \dfrac{\sqrt{1+t} - \sqrt{1-t}}{t}$

   (c) $\lim_{x \to -4} \dfrac{\sqrt{x^2+9} - 5}{x + 4}$

   (d) $\lim_{x \to 16} \dfrac{4 - \sqrt{x}}{16x - x^2}$

6. Find the numbers at which f is discontinuous. At which of these numbers is f continuous from the right, from the left, or neither? Sketch the graph of f.

$$f(x) = \begin{cases} x^2 & \text{if } x < -1 \\ x & \text{if } -1 \leqslant x < 1 \\ 1/x & \text{if } x \geqslant 1 \end{cases}$$

7. Suppose f and g are continuous functions such that $g(2) = 6$ and $\lim_{x \to 2} (3f(x) + f(x)g(x)) = 36$. Find $f(2)$.

8. Use the Intermediate Value Theorem to show that $y = x^4 + x - 3$ has a root on the interval $(1, 2)$.

9. Find the limit or show that it does not exist:

   (a) $\lim_{x \to \infty} \frac{3x - 2}{2x + 1}$

   (b) $\lim_{x \to \infty} \frac{x^4 - 3x^2 + x}{x^3 - x + 2}$

   (c) $\lim_{x \to -\infty} \frac{1 - x^2}{x^3 - x + 1}$

10. Find the horizontal and vertical asymptotes of the graphs of the following functions:

    (a) $y = \frac{5 + 4x}{x + 3}$

    (b) $y = \frac{2x^2 + 1}{3x^2 + 2x - 1}$

    (c) $y = \frac{2e^x}{e^x - 5}$

The End.