

# SAT PREP

## Assignment : AP CALCULUS BC (Limit and Continuity)

**Part A—The use of a calculator is not allowed. Part B—Calculators are allowed.**

Find the limits of the following:

- $\lim_{x \rightarrow 0} (x-5) \cos x$
- If  $b \neq 0$ , evaluate  $\lim_{x \rightarrow b} \frac{x^3 - b^3}{x^6 - b^6}$ .
- $\lim_{x \rightarrow 0} \frac{2 - \sqrt{4-x}}{x}$
- $\lim_{x \rightarrow \infty} \frac{5-6x}{2x+11}$
- $\lim_{x \rightarrow -\infty} \frac{x^2+2x-3}{x^3+2x^2}$
- $\lim_{x \rightarrow \infty} \frac{3x^2}{5x+8}$
- $\lim_{x \rightarrow -\infty} \frac{3x}{\sqrt{x^2-4}}$
- If  $f(x) = \begin{cases} e^x & \text{for } 0 \leq x < 1 \\ x^2 e^x & \text{for } 1 \leq x \leq 5 \end{cases}$ ,  
find  $\lim_{x \rightarrow 1} f(x)$ .
- $\lim_{x \rightarrow \infty} \frac{e^x}{1-x^3}$
- $\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 4x}$
- $\lim_{x \rightarrow 3^+} \frac{\sqrt{t^2-9}}{t-3}$
- The graph of a function  $f$  is shown in Figure 5.5-1.  
Which of the following statements is/are true?
  - $\lim_{x \rightarrow 4^-} f(x) = 5$ .
  - $\lim_{x \rightarrow 4} f(x) = 2$ .
  - $x=4$  is not in the domain of  $f$ .

13. Find the horizontal and vertical asymptotes of the graph of the function

$$f(x) = \frac{1}{x^2 + x - 2}$$

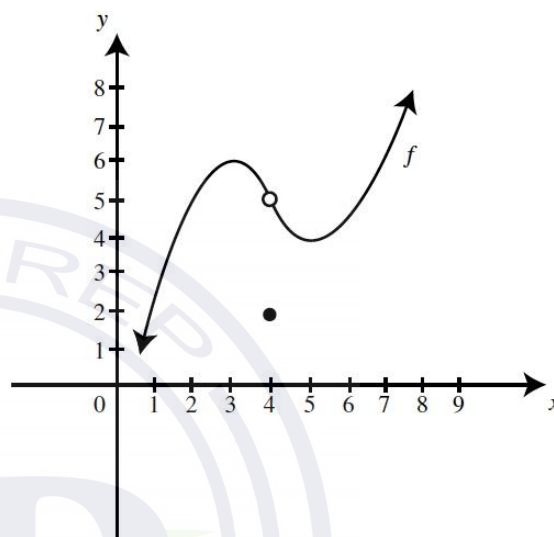


Figure 5.5-1

14. Find the limit:  $\lim_{x \rightarrow 5^+} \frac{5 + [x]}{5 - x}$  when  $[x]$  is the greatest integer of  $x$ .
15. Find the points of discontinuity of the function  $f(x) = \frac{x+1}{x^2+4x-12}$ .
16. For what value of  $k$  is the function  $g(x) = \begin{cases} x^2+5, & x \leq 3 \\ 2x-k, & x > 3 \end{cases}$  continuous at  $x=3$ ?
17. Determine if  $f(x) = \begin{cases} \frac{x^2+5x-14}{x-2}, & \text{if } x \neq 2 \\ 12, & \text{if } x = 2 \end{cases}$  is continuous at  $x=2$ . Explain why or why not.