

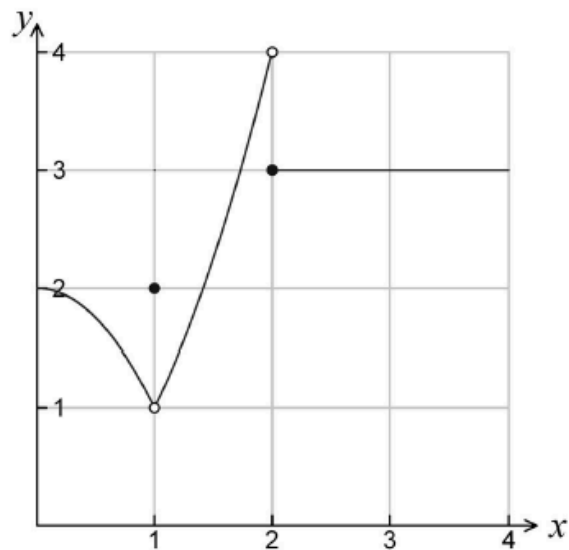
AP Calculus

Chapter 1 FR 1.2 – 1.4

#1 – 7 odd

1. The function f and its graph are shown below:

$$f(x) = \begin{cases} -x^2 + 2 & 0 \leq x < 1 \\ 2 & x = 1 \\ x^2 & 1 < x < 2 \\ 3 & x \geq 2 \end{cases}$$



(a) Calculate $\lim_{x \rightarrow 2^-} f(x)$

(b) Which value is greater $\lim_{x \rightarrow 1} f(x)$ or $f(1)$? Justify your conclusion.

(c) At what value(s) of c on the interval $[0, 4]$ does $\lim_{x \rightarrow c} f(x)$ not exist? Justify your conclusion.

3. The function g is defined as follows: $g(x) = \frac{x^2 - 4}{x^2 + 5x + 6}$.

(a) Use a table of values to estimate $\lim_{x \rightarrow -2} g(x)$ accurate to three decimal places. Show the work that leads to your conclusion.

(b) Calculate $\lim_{x \rightarrow -3^-} g(x)$ and $\lim_{x \rightarrow -3^+} g(x)$? Show the work that leads to your conclusion.

(c) $g(x)$ is undefined at $x = -2$ and $x = -3$. Explain why $\lim_{x \rightarrow -2} g(x)$ exists but $\lim_{x \rightarrow -3} g(x)$ does not exist.

5. Define $f(x) = \begin{cases} x - 4 & 1 \leq x < 2 \\ \frac{1}{x - 3} & 2 \leq x < 5 \\ -x + 5.5 & 5 \leq x \end{cases}$

(a) Show $f(x)$ is continuous at $x = 5$.

(b) Where on the interval $[1, 4]$ is f discontinuous? Show the work that leads to your conclusion.

(c) Explain the difference between a removable and an irremovable discontinuity.

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

(a) Find $\lim_{x \rightarrow -1} f(x)$ analytically.

(b) Define $g(x) = \frac{x+1}{x-1}$. What is the relationship between f and g ?

(c) Explain why $\lim_{x \rightarrow 1^+} f(x) = \infty$.