1.6a / Practice workbook

Limits by Factoring

Practice

Problems 1–7 / Show your reasoning

1 What is $\lim_{x \to -2} \dfrac{x^2 + 5x + 6}{x^2 + 3x + 2}$?

A. -1
B. 1
C. 0
D. nonexistent

1.6a / AP-style free response

Problem 2 ➤ */ Show the work and the reasons a grader looks for.*

Let k be a constant, and suppose $\lim_{x \to 3} \dfrac{x^2 + kx - 6}{3 - x}$ exists as a real number.

(a) Find k. Explain your reasoning.

(b) Find the value of the limit.

3

What is $\lim_{x \to 4} \frac{x^3 - 64}{x^2 - 4x}$?

A. 12

B. 4

C. 48

D. nonexistent

1.6a / AP-style free response

Problem 4 ➤ */ Show the work and the reasons a grader looks for.*

Let $f(x) = \dfrac{x^2 - 4}{x^2 - 5x + 6}$.

(a) Find $\lim_{x \to 2} f(x)$.

(b) Find $f(2)$, or write "undefined."

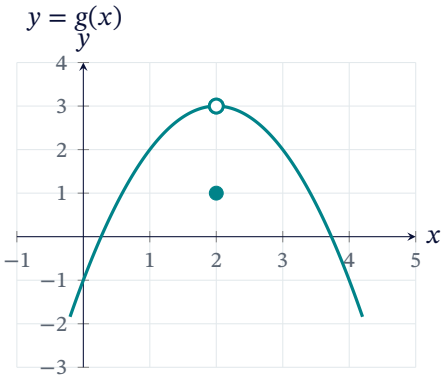
(c) Find $\lim_{x \to 3^-} f(x)$.

(d) Does $\lim_{x \to 3} f(x)$ exist? Explain.

1.6a / AP-style free response

Problem 5 ➤ */ Show the work and the reasons a grader looks for.*

Let $f(x) = \dfrac{2x^2 - 3x - 2}{x - 2}$. The graph of g is shown.



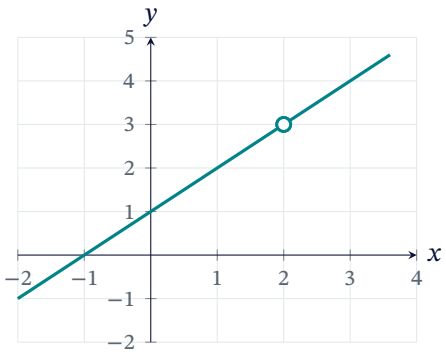
(a) Find $\lim_{x \to 2} f(x)\, g(x)$.

(b) Find $\lim_{x \to 2} \dfrac{f(x)}{g(x) - 3}$. Explain.

6 What is $\lim_{x \to 2} \dfrac{4 - x^2}{x^2 - 3x + 2}$?

A. 4
B. -1
C. -4
D. nonexistent

7 The graph of f is shown. Which of the following could be $f(x)$?



A. $\dfrac{x^2 + 4x + 3}{x + 3}$
B. $\dfrac{x^2 - x - 2}{2 - x}$
C. $\dfrac{x^2 + x - 6}{x - 2}$
D. $\dfrac{x^2 - x - 2}{x - 2}$

1.6a / Answer key

Limits by Factoring

1 (A)

2 (a) $k = -1$: the bottom approaches 0, so the top must approach 0 too: $9 + 3k - 6 = 0$; (b) -5

3 (A)

4 (a) -4; (b) undefined; (c) $-\infty$ (not a real-number limit); (d) No: near 3 the top approaches 5 and the bottom approaches 0, through negative values on the left and positive values on the right. So $f(x)$ decreases without bound on the left and increases without bound on the right

5 (a) 15; (b) $-\infty$: $f(x)$ approaches 5, and $g(x) < 3$ near 2, so $g(x) - 3$ approaches 0 through negative values. The quotient decreases without bound

6 (C)

7 (D)