2 Algebraic Limits

Find the limit.

1. $\lim_{x\to 3}\frac{2x-3}{x+5}$

2. $\lim_{x\to 3}\frac{\sqrt{x+1}}{x-4}$

3. $\lim_{x\to 4}\sqrt[3]{x+4}$

4. $\lim_{x\to 0}(2x-1)^3$

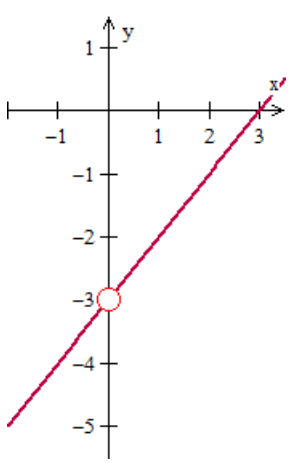
5. $f(x)=x+7,\ g(x)=x^2$
   a. $\lim_{x\to -3} f(x)$
   b. $\lim_{x\to 4} g(x)$
   c. $\lim_{x\to -3} g(f(x))$

6. $f(x)=2x^2-3x+1,\ g(x)=\sqrt[3]{x+6}$
   a. $\lim_{x\to 4} f(x)$
   b. $\lim_{x\to 21} g(x)$
   c. $\lim_{x\to 4} g(f(x))$

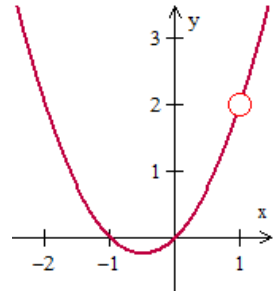
7. $\lim_{x\to \pi}\cos 3x$

8-11 Use the graph to find the limit visually if it exists. Write a simpler function that agrees with the given function at all but one point.

8. $g(x)=\frac{x^2-3x}{x}$
   a. $\lim_{x\to -2} g(x)$
   b. $\lim_{x\to 0} h(x)$



9. $g(x)=\frac{x^3-x}{x-1}$
   a. $\lim_{x\to 1} g(x)$
   b. $\lim_{x\to -1} g(x)$



10. $\lim_{x\to -1}\frac{x^2-1}{x+1}$

11. $\lim_{x\to -1}\frac{2x^2-x-3}{x+1}$

12. $\lim_{x\to 2}\frac{x^3-8}{x-2}$

13. $\lim_{x\to -1}\frac{x^3+1}{x+1}$

14. $\lim_{x\to 5}\frac{x-5}{x^2-25}$

15. $\lim_{x\to 2}\frac{2-x}{x^2-4}$

16. $\lim_{x\to -3}\frac{x^2+x-6}{x^2-9}$

17. $\lim_{x\to 4}\frac{x^2-5x+4}{x^2-2x-8}$

18. $\lim_{x\to 0}\frac{\sqrt{x+5}-\sqrt{5}}{x}$

19. $\lim_{x\to 0}\frac{\sqrt{2+x}-\sqrt{2}}{x}$

20. $\lim_{x\to 4}\frac{\sqrt{x+5}-3}{x-4}$

21. $\lim_{x\to 3}\frac{\sqrt{x+1}-2}{x-3}$

22. $\lim_{x\to 0}\frac{1/(3+x)-(1/3)}{x}$

23. $\lim_{x\to 0}\frac{\frac{1}{x+4}-\frac{1}{4}}{x}$

24. $\lim_{\Delta x\to 0}\frac{(x+\Delta x)^2-x^2}{\Delta x}$

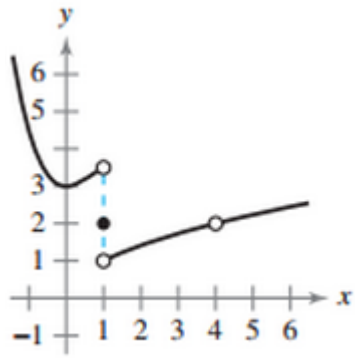
25. $\lim_{\Delta x \to 0} \frac{(x+\Delta x)^3 - x^3}{\Delta x}$

26. (a) $f(1)$

(b) $\lim_{x \to 1} f(x)$

(c) $f(4)$

(d) $\lim_{x \to 4} f(x)$



27. (a) $f(-2)$

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

(c) $f(0)$

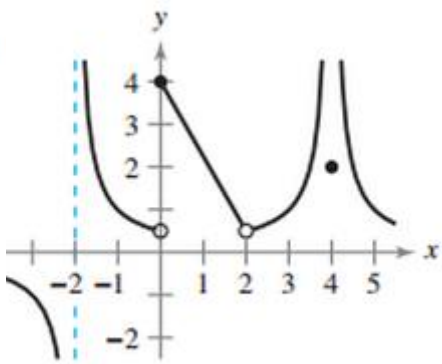
(d) $\lim_{x \to 0} f(x)$

(e) $f(2)$

(f) $\lim_{x \to 2} f(x)$

(g) $f(4)$

(h) $\lim_{x \to 4} f(x)$



Answers

1. 3/8
2. -2
3. 2
4. -1
5. -
    a. 4
    b. 16
    c. 16
6. -
    a. 21
    b. 3
    c. 3
7. -1
8. $f(x) = x - 3$
    a. -5
    b. -3
9. $f(x) = x(x+1)$
    a. 2
    b. 0
10. $g(x) = x - 1;\ -2$
11. $g(x) = 2x - 3;\ -5$
12. 12
13. 3
14. 1/10
15. -1/4
16. 5/6
17. ½
18. $\frac{\sqrt{5}}{10}$
19. $\frac{\sqrt{2}}{4}$
20. 1/6
21. ¼
22. -1/9
23. -1/16
24. 2x
25. $3x^2$
26. -
    a. 2
    b. Dne
    c. Dne
    d. 2
27. -
    a. Dne
    b. Dne
    c. 4
    d. Dne
    e. Dne
    f. ½
    g. 2
    h. ∞