Chapter 1, Form A

1. Consider $\lim_{x\to 5} f(x)$, where $f(x)=\dfrac{x^2-25}{x-5}$.

(a) Complete the following input-output tables.

$x \to 5^-$	$f(x)$
4	
4.7	
4.9	
4.99	
4.999	
4.9999	

$x \to 5^+$	$f(x)$
6	
5.5	
5.1	
5.01	
5.001	
5.0001	

1. (a) _____

_____

(b) Find $\lim_{x\to 5^-} f(x)$, $\lim_{x\to 5^+} f(x)$, and $\lim_{x\to 5} f(x)$, if each exists.

(b) _____

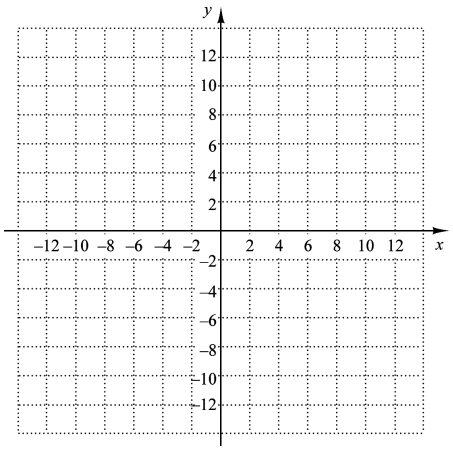
_____

_____

2. Consider $\lim_{x\to 5} f(x)$, where $f(x)=\dfrac{x^2-25}{x-5}$.

(a) Graph the function and use the graph to find the limit.

2. (a) _____

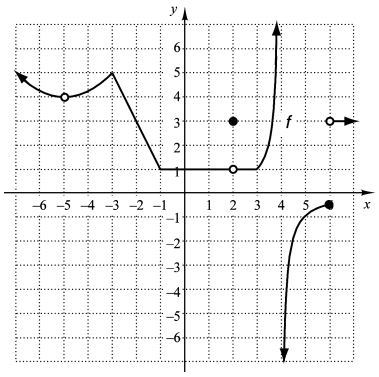


(b) Find the limit algebraically. Show all work.

(b) _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Limits Graphically. Consider the following graph of function f for Questions 3-8.



Find the limit, if it exists.

3. $\lim_{x \to -3} f(x)$ **3.** _____

4. $\lim_{x \to 4} f(x)$ **4.** _____

5. $\lim_{x \to 2} f(x)$ **5.** _____

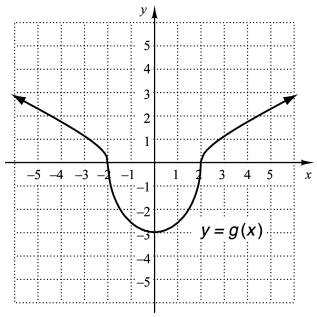
6. $\lim_{x \to 6} f(x)$ **6.** _____

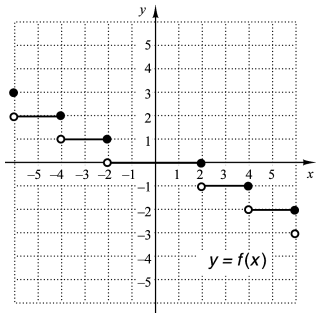
7. $\lim_{x \to -2} f(x)$ **7.** _____

8. $\lim_{x \to -5} f(x)$ **8.** _____

Determine whether the function is continuous. If a function is discontinuous, state why.

9. **10.** **9.** _____





10. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

For the function in Question 10, answer the following.

11. Find $\lim_{x\to -4} f(x)$. **11.** _____

12. Find $f(-4)$. **12.** _____

13. Is f continuous at -4? **13.** _____

14. Find $\lim_{x\to -3} f(x)$. **14.** _____

15. Find $f(-3)$. **15.** _____

16. Is f continuous at -3? **16.** _____

Find the limit if it exists.

17. $\lim_{x\to 4}(x^4 - 5x^2 + 2)$ **17.** _____

18. $\lim_{x\to -4^-} \dfrac{x+4}{x^2 - x - 20}$ **18.** _____

19. $\lim_{x\to 0} -\dfrac{3}{x}$ **19.** _____

20. Find the simplified difference quotient for: $f(x) = -3x^2 + 7$. **20.** _____

21. Find an equation of the tangent line to the graph of $y = 4x + \left(-\frac{6}{x}\right)$ at the point (3, 10). **21.** _____

22. Find the points on the graph of $y = x^3 - 2x^2$ at which the tangent line is horizontal. **22.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Find dy/dx.

23. $y = x^{17}$ **23.** _____

24. $y = 8\sqrt[4]{x} - 3\sqrt{x}$ **24.** _____

25. $y = -\dfrac{8}{x^3}$ **25.** _____

26. $y = x^{3/8}$ **26.** _____

27. $y = 0.32x^4 - 7x^2 + 3$ **27.** _____

Differentiate.

28. $y = \dfrac{5}{8}x^8 - 4x^6 + 5x + 10$ **28.** _____

29. $y = \dfrac{x+4}{4-x}$ **29.** _____

30. $f(x) = (3-x)^4(x+5)^3$ **30.** _____

31. $y = (6x^2 - 10x + 1)^{-4}$ **31.** _____

32. $f(x) = x\sqrt{x^3 - 6}$ **32.** _____

33. For $y = 4x^6 - 9x^3$, find $\dfrac{d^3y}{dx^3}$. **33.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

34. *Business: average revenue, cost and profit.* Given revenue and cost functions $R(x) = 40x$ and $C(x) = x^{1/4} + 650$, where x is the number of items produced and $R(x)$ and $C(x)$ are in dollars, find:

(a) The average revenue, the average cost and the average profit when x items are produced.

(b) The rate at which average cost is changing when 15 items are produced.

34. (a) _____

_____

_____

(b) _____

35. *Volume of a scoop of ice cream.* The volume of a spherical scoop of ice cream with radius r is given by $V = \frac{4}{3}\pi r^3$, where r is measured in inches.

(a) Find the rate of change of the volume of the scoop of ice cream with respect to the radius.

(b) What is the volume when the radius is 0.5 in.?

(c) Find the rate of change of the volume of the scoop of ice cream when $r = 0.5$.

35. (a) _____

(b) _____

(c) _____

36. Find $(f \circ g)(x)$ and $(g \circ f)(x)$, given that $f(x) = x^2 + 9$ and $g(x) = x^3 - 1$.

36. _____

---

37. Differentiate $y = \sqrt{(2-3x)^{2/3}(5+x)^{1/2}}$.

37. _____

38. Find $\lim\limits_{x \to 2} \dfrac{x^3 - 8}{x - 2}$.

38. _____

---

39. Graph f and f' over the given interval. Then estimate points at which the tangent line to f is horizontal.

$f(x) = 6x^3 - 20x^2 + 10x + 3\sqrt{x}; \ [0, 5]$

39. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

40. Find the following limit by creating a table of values:

$$\lim_{x\to 6}\frac{\sqrt{2x+4}-4}{x-6}.$$

Start with $\Delta Tbl = 0.1$ and then go to 0.01 and 0.001. When you think you know the limit, graph

$$y=\frac{\sqrt{2x+4}-4}{x-6}$$

and use the TRACE feature to further verify your assertion.

40 . _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Chapter 1, Form B

1. Consider $\lim_{x\to 3} f(x)$, where $f(x)=\dfrac{x^2-9}{x-3}$.

(a) Complete the following input-output tables.

$x \to 3^-$	$f(x)$
2	
2.7	
2.9	
2.99	
2.999	
2.9999	

$x \to 3^+$	$f(x)$
4	
3.5	
3.1	
3.01	
3.001	
3.0001	

1. (a) _____

_____

(b) Find $\lim_{x\to 3^-} f(x)$, $\lim_{x\to 3^+} f(x)$, and $\lim_{x\to 3} f(x)$, if each exists.

(b) _____

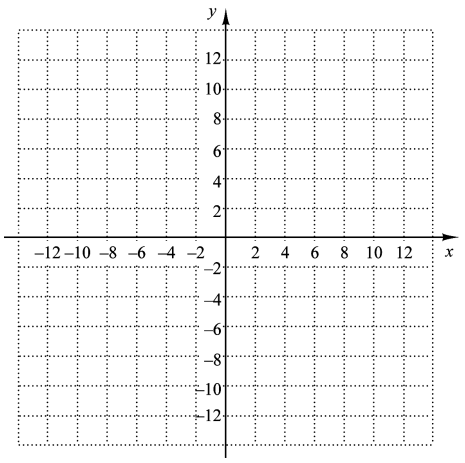
_____

_____

2. Consider $\lim_{x\to 3} f(x)$, where $f(x)=\dfrac{x^2-9}{x-3}$.

(a) Graph the function and use the graph to find the limit.

2. (a) _____

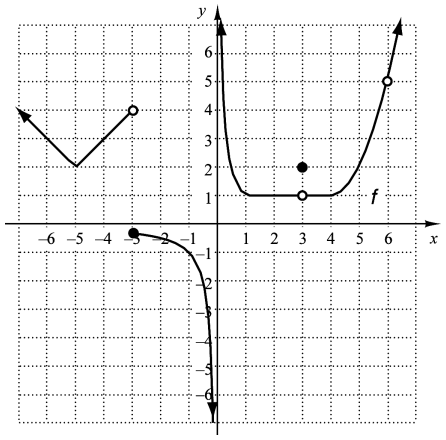


(b) Find the limit algebraically. Show all work.

(b) _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Limits Graphically. Consider the following graph of function f for Questions 3-8.



Find the limit, if it exists.

3. $\lim_{x \to -5} f(x)$ **3.** _____

4. $\lim_{x \to -3} f(x)$ **4.** _____

5. $\lim_{x \to 0} f(x)$ **5.** _____

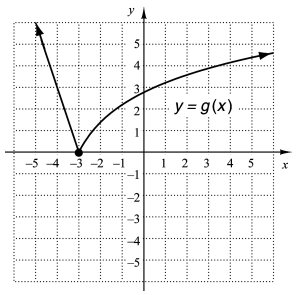
6. $\lim_{x \to 3} f(x)$ **6.** _____

7. $\lim_{x \to 5} f(x)$ **7.** _____

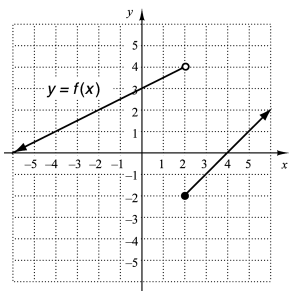
8. $\lim_{x \to 6} f(x)$ **8.** _____

Determine whether the function is continuous. If a function is discontinuous, state why.

9.



10.



9. _____

10. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

For the function in Question 10, answer the following.

11. Find $\lim_{x\to 0} f(x)$. **11.** _____

12. Find $f(0)$. **12.** _____

13. Is f continuous at 0? **13.** _____

14. Find $\lim_{x\to 2} f(x)$. **14.** _____

15. Find $f(2)$. **15.** _____

16. Is f continuous at 2? **16.** _____

Find the limit if it exists.

17. $\lim_{x\to 2}(-3x^3+5x^2+6)$ **17.** _____

18. $\lim_{x\to 5^+}\dfrac{x-5}{x^2-x-20}$ **18.** _____

19. $\lim_{x\to 0}\dfrac{8}{x}$ **19.** _____

20. Find the simplified difference quotient for: $f(x)=-5x^2-3$. **20.** _____

21. Find an equation of the tangent line to the graph of $y=-2x+\left(\frac{6}{x}\right)$ at the point $(2,-1)$. **21.** _____

22. Find the points on the graph of $y=6x^3+9x^2$ at which the tangent line is horizontal. **22.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Find dy/dx.

23. $y = x^{53}$ **23.** _____

24. $y = 5\sqrt[3]{x} + 4\sqrt{x}$ **24.** _____

25. $y = -\dfrac{11}{x^2}$ **25.** _____

26. $y = x^{2/5}$ **26.** _____

27. $y = 0.18x^3 - 5x^2 + 4$ **27.** _____

Differentiate.

28. $y = \dfrac{2}{3}x^3 - 4x^2 + 10x + 6$ **28.** _____

29. $y = \dfrac{5x + 2}{x^4}$ **29.** _____

30. $f(x) = (x + 2)^3(2 - x)^2$ **30.** _____

31. $y = (3x^4 - 4x^2 + 6)^{-5}$ **31.** _____

32. $f(x) = x^2\sqrt{x - 5}$ **32.** _____

33. For $y = 5x^4 - x^2 + 6$, find $\dfrac{d^3y}{dx^3}$. **33.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

34. *Business: average revenue, cost and profit.* Given revenue and cost functions $R(x) = 50x$ and $C(x) = x^{3/5} + 750$, where x is the number of items produced and $R(x)$ and $C(x)$ are in dollars, find:

(a) The average revenue, the average cost and the average profit when x items are produced.

(b) The rate at which average cost is changing when 12 items are produced.

34. (a) _____

_____

_____

(b) _____

35. *Growth of baby boy.* The median weight of a boy, in pounds, whose age is between 0 and 36 months, can be approximated by the function: $W = 8.15 + 1.82t - 0.0596t^2 + 0.000758t^3$, where time t is measured in months.

(a) Find the rate of change of the weight of the baby boy with respect to time.

(b) What is the weight of the baby boy when he is 18 months old?

(c) Find the rate of change of the baby's weight when he is 18 months old.

35. (a) _____

(b) _____

(c) _____

36. Find $(f \circ g)(x)$ and $(g \circ f)(x)$, given that $f(x) = 4x + x^2$ and $g(x) = \sqrt{x} + 1$.

36. _____

---

37. Differentiate $y = \sqrt{(5-4x)^{4/3}(5+4x)^{1/2}}$.

37. _____

38. Find $\lim\limits_{x \to 3} \dfrac{27 - x^3}{3 - x}$.

38. _____

---

39. Graph f and f' over the given interval. Then estimate points at which the tangent line to f is horizontal.

$f(x) = 4x^3 - 25x^2 + 32x + 4\sqrt{x}; \ [0, 5]$

39. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

40. Find the following limit by creating a table of values:

$$\lim_{x\to 2}\frac{\sqrt{7x+2}-4}{2-x}$$

Start with $\Delta Tbl = 0.1$ and then go to 0.01 and 0.001. When you think you know the limit, graph

$$y=\frac{\sqrt{7x+2}-4}{2-x}$$

and use the TRACE feature to further verify your assertion.

40. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Chapter 1, Form C

1. Consider $\lim_{x\to 4} f(x)$, where $f(x)=\dfrac{x^2-16}{x-4}$.

(a) Complete the following input-output tables.

$x \to 4^-$	$f(x)$
3	
3.7	
3.9	
3.99	
3.999	
3.9999	

$x \to 4^+$	$f(x)$
5	
4.5	
4.1	
4.01	
4.001	
4.0001	

1. (a) _____

_____

(b) Find $\lim_{x\to 4^-} f(x)$, $\lim_{x\to 4^+} f(x)$, and $\lim_{x\to 4} f(x)$, if each exists.

b) _____

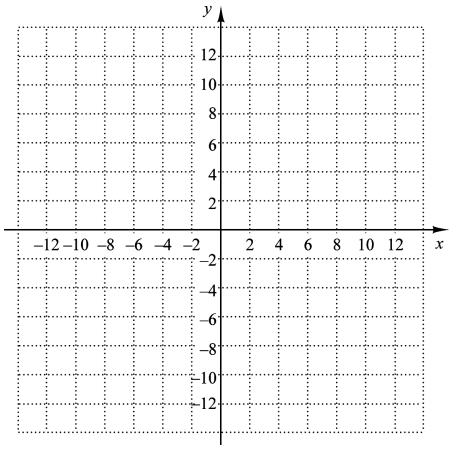
_____

_____

2. Consider $\lim_{x\to 4} f(x)$, where $f(x)=\dfrac{x^2-16}{x-4}$.

(a) Graph the function and use the graph to find the limit.

2. (a) _____

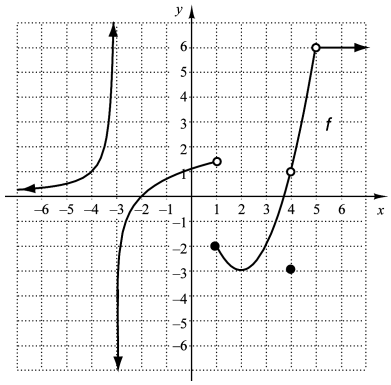


(b) Find the limit algebraically. Show all work.

(b) _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Limits Graphically. Consider the following graph of function f for Questions 3-8.



Find the limit, if it exists.

3. $\lim_{x \to -3} f(x)$ **3.** _____

4. $\lim_{x \to -2} f(x)$ **4.** _____

5. $\lim_{x \to 1} f(x)$ **5.** _____

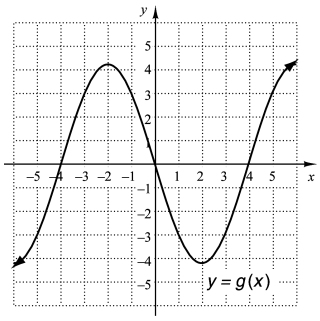
6. $\lim_{x \to 2} f(x)$ **6.** _____

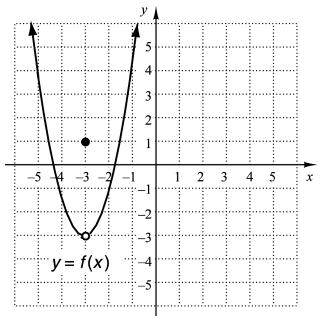
7. $\lim_{x \to 4} f(x)$ **7.** _____

8. $\lim_{x \to 5} f(x)$ **8.** _____

Determine whether the function is continuous. If a function is discontinuous, state why.

9. **10.**





9. _____

10. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

For the function in Question 10, answer the following.

11. Find $\lim_{x\to -3} f(x)$. **11.** _____

12. Find $f(-3)$. **12.** _____

13. Is f continuous at -3? **13.** _____

14. Find $\lim_{x\to -1} f(x)$. **14.** _____

15. Find $f(-1)$. **15.** _____

16. Is f continuous at -1? **16.** _____

Find the limit if it exists.

17. $\lim_{x\to -2}(4x^3 - 6x^2 - 3x + 1)$ **17.** _____

18. $\lim_{x\to 2^-} \dfrac{x^2 - 11x + 18}{x - 2}$ **18.** _____

19. $\lim_{x\to 0} \dfrac{15}{x}$ **19.** _____

20. Find the simplified difference quotient for: $f(x) = 4x^2 + 6$ **20.** _____

21. Find an equation of the tangent line to the graph of $y = -x + \left(\frac{4}{x}\right)$ at the point $(2, 0)$. **21.** _____

22. Find the points on the graph of $y = 3x^3 - 9x$ at which the tangent line is horizontal. **22.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Find dy/dx.

23. $y = x^{46}$ **23.** _____

24. $y = 5\sqrt[3]{x} + 2\sqrt{x}$ **24.** _____

25. $y = -\dfrac{7}{x^7}$ **25.** _____

26. $y = x^{7/3}$ **26.** _____

27. $y = 6.3x^3 - 4x^2 - 5$ **27.** _____

Differentiate.

28. $y = -\dfrac{2}{3}x^3 + 16x^2 + 4x + 11$ **28.** _____

29. $y = \dfrac{2x-1}{x^4}$ **29.** _____

30. $f(x) = (x+5)^5(4-x)^2$ **30.** _____

31. $y = (3x^3 - 5x^2 + 8)^{-3}$ **31.** _____

32. $f(x) = x\sqrt{x^4 + 2}$ **32.** _____

33. For $y = 3x^6 - 4x^3$, find $\dfrac{d^3y}{dx^3}$. **33.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

34. *Business: average revenue, cost and profit.* Given revenue and cost functions $R(x) = 25x$ and $C(x) = x^{2/5} + 400$, where x is the number of items produced and $R(x)$ and $C(x)$ are in dollars, find:

(a) The average revenue, the average cost and the average profit when x items are produced.

34. (a) _____

(b) The rate at which average cost is changing when 18 items are produced.

(b) _____

35. *Ozone level.* The ozone level (in parts per billion) in a metropolitan area is modeled by $P = 60 + 15t - t^2$, where t is time in hours and $t = 0$ corresponds to 8:00am.

(a) Find the rate of change of the ozone level with respect to time.

35. (a) _____

(b) What is the ozone level at $t = 6$?

(b) _____

(c) Find the rate of change of the ozone level at $t = 6$.

(c) _____

36. Find $(f \circ g)(x)$ and $(g \circ f)(x)$, given that $f(x) = 3x^2 - x$ and $g(x) = -6x^3$.

36. _____

---

37. Differentiate $y = \sqrt{(4-3x)^{6/5}(1+x)^{2/5}}$.

37. _____

38. Find $\lim\limits_{x \to -2} \dfrac{x^3 + 8}{x + 2}$.

38. _____

---

39. Graph f and f' over the given interval. Then estimate points at which the tangent line to f is horizontal.

$$f(x) = 2x^5 - 5x^2 - x + 2; \ [-3, 3]$$

39. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

40. Find the following limit by creating a table of values:

$$\lim_{x\to 0}\frac{\sqrt{16-4x}-4}{x}.$$

Start with $\Delta Tbl = 0.1$ and then go to 0.01 and 0.001. When you think you know the limit, graph

$$y=\frac{\sqrt{16-4x}-4}{x}$$

and use the TRACE feature to further verify your assertion.

40. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Chapter 1, Form D

1. Consider $\lim_{x\to -4} f(x)$, where $f(x)=\dfrac{x^2-16}{x+4}$.

(a) Complete the following input-output tables.

$x \to -4^-$	$f(x)$
–5	
–4.5	
–4.1	
–4.01	
–4.001	
–4.0001	

$x \to -4^+$	$f(x)$
–3	
–3.7	
–3.9	
–3.99	
–3.999	
–3.9999	

(b) Find $\lim_{x\to -4^-} f(x)$, $\lim_{x\to -4^+} f(x)$, and $\lim_{x\to -4} f(x)$, if each exists

1. (a) _____

_____

b) _____

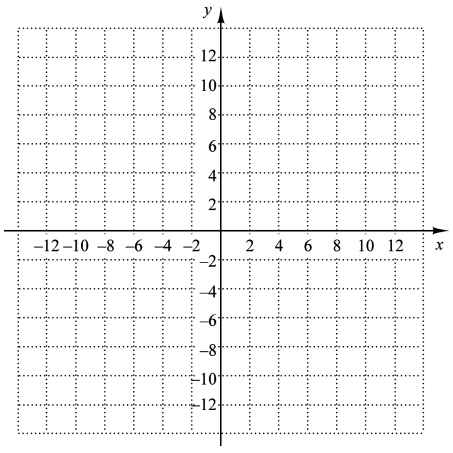
_____

_____

2. Consider $\lim_{x\to -4} f(x)$, where $f(x)=\dfrac{x^2-16}{x+4}$.

(a) Graph the function and use the graph to find the limit.

2. (a) _____

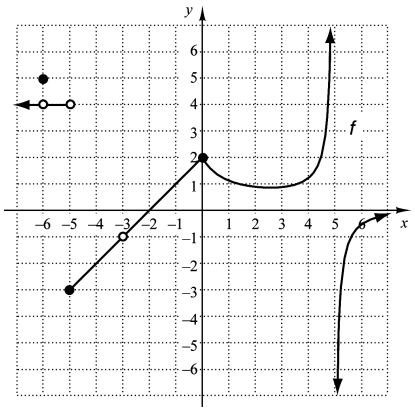


b) Find the limit algebraically. Show all work.

(b) _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Limits Graphically. Consider the following graph of function f for Questions 3-8.



Find the limit, if it exists.

3. $\lim_{x \to -5} f(x)$ **3.** _____

4. $\lim_{x \to -3} f(x)$ **4.** _____

5. $\lim_{x \to 0} f(x)$ **5.** _____

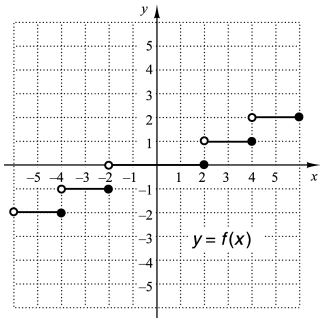
6. $\lim_{x \to -2} f(x)$ **6.** _____

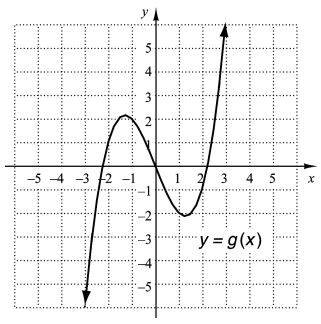
7. $\lim_{x \to 5} f(x)$ **7.** _____

8. $\lim_{x \to -6} f(x)$ **8.** _____

Determine whether the function is continuous. If a function is discontinuous, state why.

9. **10.**





9. _____

10. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

For the function in Question 9, answer the following.

11. Find $\lim_{x\to -3} f(x)$. **11.** _____

12. Find $f(-3)$. **12.** _____

13. Is f continuous at -3? **13.** _____

14. Find $\lim_{x\to 4} f(x)$. **14.** _____

15. Find $f(4)$. **15.** _____

16. Is f continuous at 4? **16.** _____

Find the limit if it exists.

17. $\lim_{x\to -1}(5x^4+3x^3-6x^2-4x)$ **17.** _____

18. $\lim_{x\to -2^-}\dfrac{x+2}{3x(x^2-4)}$ **18.** _____

19. $\lim_{x\to 2}\dfrac{5}{x-2}$ **19.** _____

20. Find the simplified difference quotient for: $f(x)=3x^2-7x$. **20.** _____

21. Find an equation of the tangent line to the graph of $y=4x+\left(-\frac{10}{x}\right)$ at the point $(5,18)$. **21.** _____

22. Find the points on the graph of $y=2x^3-3x^2$ at which the tangent line is horizontal. **22.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Find dy/dx.

23. $y = x^{28}$ **23.** _____

24. $y = 2\sqrt[4]{x} - 4\sqrt{x}$ **24.** _____

25. $y = \dfrac{4}{x^8}$ **25.** _____

26. $y = x^{2/7}$ **26.** _____

27. $y = 2.7x^3 - 3x^2 - 1$ **27.** _____

Differentiate.

28. $y = \dfrac{1}{10}x^5 + 3x^4 - 6x - 6$ **28.** _____

29. $y = \dfrac{6-x}{x^2}$ **29.** _____

30. $f(x) = (x+1)^3(6-x)^2$ **30.** _____

31. $y = (2x^3 + 16x^2 - 3x)^{-4}$ **31.** _____

32. $f(x) = x^2\sqrt{x^4 - 1}$ **32.** _____

33. For $y = 2x^6 - 10x^2$, find $\dfrac{d^3y}{dx^3}$. **33.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

34. *Business: average revenue, cost and profit.* Given revenue and cost functions $R(x) = 45x$ and $C(x) = x^{3/4} + 550$, where x is the number of items produced and $R(x)$ and $C(x)$ are in dollars, find:

(a) The average revenue, the average cost and the average profit when x items are produced.

(b) The rate at which average cost is changing when 20 items are produced

34. (a) _____

_____

_____

(b) _____

35. *Population growth rate.* The population of a city grows from an initial size of 50,000 to a size of P given by $P = 50{,}000 + 1800t^2$, where t is in years.

(a) Find the rate of change (growth rate) of the population with respect to t.

(b) What is the population of this city after 20 years?

(c) Find the rate of change of the population of this city after 20 years.

35. (a) _____

(b) _____

(c) _____

36. Find $(f \circ g)(x)$ and $(g \circ f)(x)$, given that $f(x) = \sqrt{x+4}$ and $g(x) = x^2 + x$.

36. _____

---

37 Differentiate $y = \sqrt{(5-2x)^{1/4}(x+6)^{3/4}}$.

37. _____

38. Find $\lim\limits_{x \to 5} \dfrac{x^3 - 125}{x - 5}$.

38. _____

---

39. Graph f and f' over the given interval. Then estimate points at which the tangent line to f is horizontal.

$f(x) = 2x^3 - 6x^2 + 2x + 2\sqrt{x}$; [0, 5]

39. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

40. Find the following limit by creating a table of values:

$$\lim_{x\to 5}\frac{\sqrt{6x-5}-5}{x-5}.$$

Start with $\Delta Tbl = 0.1$ and then go to 0.01 and 0.001. When you think you know the limit, graph

$$y=\frac{\sqrt{6x-5}-5}{x-5}$$

and use the TRACE feature to further verify your assertion.

40. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Chapter 1, Form E

1. Consider $\lim_{x\to -5} f(x)$, where $f(x)=\dfrac{x^2-25}{x+5}$.

(a) Complete the following input-output tables.

$x \to -5^-$	$f(x)$
−6	
−5.5	
−5.1	
−5.01	
−5.001	
−5.0001	

$x \to -5^+$	$f(x)$
−4	
−4.7	
−4.9	
−4.99	
−4.999	
−4.9999	

1. (a) _____

_____

(b) Find $\lim_{x\to -5^-} f(x)$, $\lim_{x\to -5^+} f(x)$, and $\lim_{x\to -5} f(x)$, if each exists.

b) _____

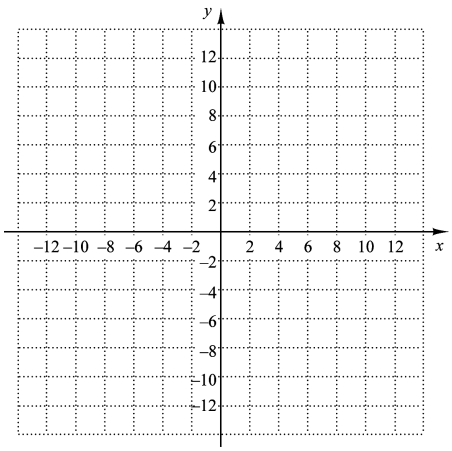
_____

_____

2. Consider $\lim_{x\to -5} f(x)$, where $f(x)=\dfrac{x^2-25}{x+5}$.

(a) Graph the function and use the graph to find the limit.

2. (a) _____

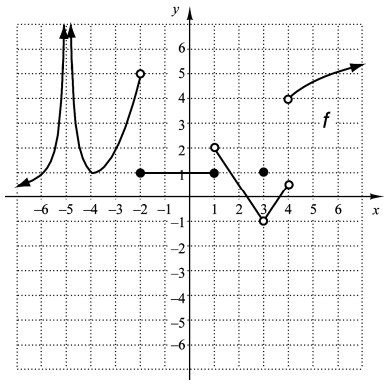


(b) Find the limit algebraically. Show all work.

(b) _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Limits Graphically. Consider the following graph of function f for Questions 3-8.



Find the limit, if it exists.

3. $\lim_{x \to -5} f(x)$ **3.** _____

4. $\lim_{x \to -2} f(x)$ **4.** _____

5. $\lim_{x \to 0} f(x)$ **5.** _____

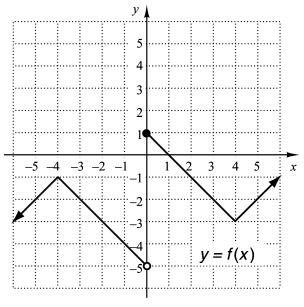
6. $\lim_{x \to 3} f(x)$ **6.** _____

7. $\lim_{x \to 4} f(x)$ **7.** _____

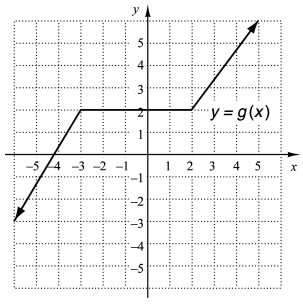
8. $\lim_{x \to -4} f(x)$ **8.** _____

Determine whether the function is continuous. If a function is discontinuous, state why.

9.



10.



9. _____

10. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

For the function in Question 9, answer the following.

11. Find $\lim_{x\to 4} f(x)$. **11.** _____

12. Find $f(4)$. **12.** _____

13. Is f continuous at 4? **13.** _____

14. Find $\lim_{x\to 0} f(x)$. **14.** _____

15. Find $f(0)$. **15.** _____

16. Is f continuous at 0? **16.** _____

Find the limit if it exists.

17. $\lim_{x\to 3} (-2x^3 + 6x^2 - 4)$ **17.** _____

18. $\lim_{x\to -3^+} \dfrac{x+3}{x(x^2-9)}$ **18.** _____

19. $\lim_{x\to -6} \dfrac{6}{x+6}$ **19.** _____

20. Find the simplified difference quotient for: $f(x) = 5x^2 - 8x$. **20.** _____

21. Find an equation of the tangent line to the graph of $y = 2x + \left(\frac{3}{x}\right)$ at the point (1, 5). **21.** _____

22. Find the points on the graph of $y = x^3 - 3x^2$ at which the tangent line is horizontal. **22.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Find dy/dx.

23. $y = x^{113}$ **23.** _____

24. $y = 5\sqrt[3]{x} + 6\sqrt{x}$ **24.** _____

25. $y = \dfrac{120}{x^5}$ **25.** _____

26. $y = x^{4/5}$ **26.** _____

27. $y = 0.59x^4 - 6x^2 + 8$ **27.** _____

Differentiate.

28. $y = \dfrac{3}{4}x^4 - 5x^2 + 4x + 1$ **28.** _____

29. $y = \dfrac{3x}{3 - x}$ **29.** _____

30. $f(x) = (x+1)^3(3-x)^4$ **30.** _____

31. $y = (6x^2 + 2x^5 + x^6)^{-4}$ **31.** _____

32. $f(x) = x\sqrt{x^6 - 2}$ **32.** _____

33. For $y = 280x - 3x^5$, find $\dfrac{d^3y}{dx^3}$. **33.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

34. *Business: average revenue, cost and profit.* Given revenue and cost functions $R(x) = 25x$ and $C(x) = x^{1/3} + 1000$, where x is the number of items produced and $R(x)$ and $C(x)$ are in dollars, find:

(a) The average revenue, the average cost and the average profit when x items are produced.

(b) The rate at which average cost is changing when 25 items are produced.

34. (a) _____

_____

_____

(b) _____

35. *Social Sciences: memory.* In a certain memory experiment, a person is able to memorize M words after t minutes, where $M = -0.002t^3 + 0.1t^2$.

(a) Find the rate of change of the number of words memorized with respect to time.

(b) How many words are memorized during the first 20 minutes (at $t = 20$)?

(c) Find the rate at which words are being memorized after 20 minutes?

35. (a) _____

(b) _____

(c) _____

36. Find $(f \circ g)(x)$ and $(g \circ f)(x)$, given that $f(x) = 2x^2 - x$ and $g(x) = x + 5$.

36. _____

---

37. Differentiate $y = \sqrt{(6-3x)^{1/3}(10+x)^{4/3}}$.

37. _____

38. Find $\lim\limits_{x \to -4} \dfrac{x^3 + 64}{x + 4}$.

38. _____

---

39. Graph f and f' over the given interval. Then estimate points at which the tangent line to f is horizontal. Sketch the graphs.

$$f(x) = 3x^5 - 15x^2 + 15x;\ [-3,\ 3]$$

39. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

40. Find the following limit by creating a table of values:

$$\lim_{x\to 0}\frac{\sqrt{x^2+1}-1}{x}.$$

Start with $\Delta Tbl = 0.1$ and then go to 0.01 and 0.001. When you think you know the limit, graph

$$y=\frac{\sqrt{x^2+1}-1}{x}$$

and use the TRACE feature to further verify your assertion.

40. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Chapter 1, Form F

1. Consider $\lim_{x\to -3} f(x)$, where $f(x)=\dfrac{x^2-9}{x+3}$.

(a) Complete the following input-output tables.

$x \to -3^-$	$f(x)$
−4	
−3.5	
−3.1	
−3.01	
−3.001	
−3.0001	

$x \to -3^+$	$f(x)$
−2	
−2.7	
−2.9	
−2.99	
−2.999	
−2.9999	

1. (a) _____

_____

(b) Find $\lim_{x\to -3^-} f(x)$, $\lim_{x\to -3^+} f(x)$, and $\lim_{x\to -3} f(x)$, if each exists.

b) _____

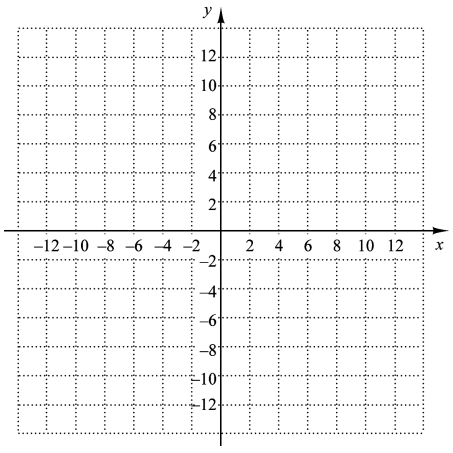
_____

_____

2. Consider $\lim_{x\to -3} f(x)$, where $f(x)=\dfrac{x^2-9}{x+3}$.

(a) Graph the function and use the graph to find the limit.

2. (a) _____

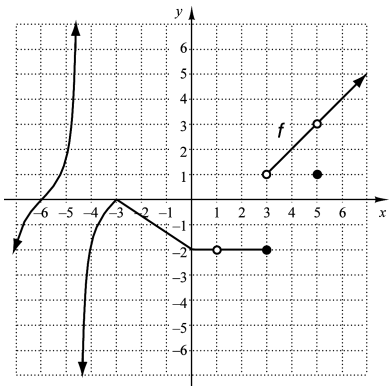


(b) Find the limit algebraically. Show all work.

(b) _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Limits Graphically. Consider the following graph of function *f* for Questions 3-8.



Find the limit, if it exists.

3. $\lim_{x \to -3} f(x)$ **3.** _____

4. $\lim_{x \to -4.5} f(x)$ **4.** _____

5. $\lim_{x \to 0} f(x)$ **5.** _____

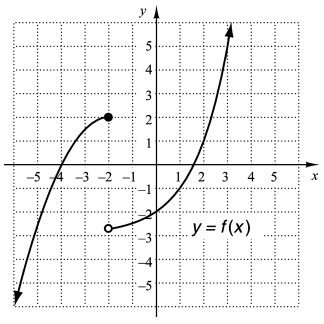
6. $\lim_{x \to 3} f(x)$ **6.** _____

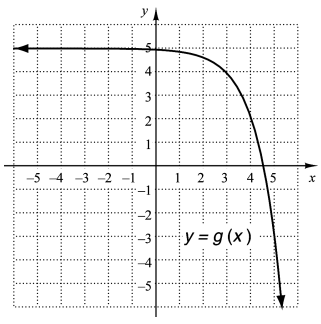
7. $\lim_{x \to 5} f(x)$ **7.** _____

8. $\lim_{x \to 2} f(x)$ **8.** _____

Determine whether the function is continuous. If a function is discontinuous, state why.

9. **10.**





9. _____

10. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

For the function in Question 9, answer the following.

11. Find $\lim_{x\to -2} f(x)$. **11.** _____

12. Find $f(-2)$. **12.** _____

13. Is f continuous at -2? **13.** _____

14. Find $\lim_{x\to 3} f(x)$. **14.** _____

15. Find $f(3)$. **15.** _____

16. Is continuous at 3? **16.** _____

Find the limit if it exists.

17. $\lim_{x\to -4}(5x - x^2 - 2x^3)$ **17.** _____

18. $\lim_{x\to 5^+} \dfrac{x-5}{4(x^2-25)}$ **18.** _____

19. $\lim_{x\to -3} \dfrac{4}{x+3}$ **19.** _____

20. Find the simplified difference quotient for: **20.** _____

$f(x) = 4x^2 - 6x$.

21. Find an equation of the tangent line to the graph of $y = 3x + \left(\frac{8}{x}\right)$ at the point $(2,\ 10)$. **21.** _____

22. Find the points on the graph of $y = x^3 - 2x^2$ at which the tangent line is horizontal. **22.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

Find dy/dx.

23. $y = x^{85}$ **23.** _____

24. $y = 6\sqrt[4]{x} - 2\sqrt{x}$ **24.** _____

25. $y = \dfrac{3}{x^4}$ **25.** _____

26. $y = x^{3/5}$ **26.** _____

27. $y = 4.1x^4 - 5x^2 + 7$ **27.** _____

Differentiate.

28. $y = \dfrac{3}{4}x^4 + 8x^2 - 161x + 25$ **28.** _____

29. $y = \dfrac{4x^2 + 1}{x^4}$ **29.** _____

30. $f(x) = (x+2)^4(3-x)^2$ **30.** _____

31. $y = (4x^3 - 2x^2 + 5)^{-4}$ **31.** _____

32. $f(x) = x^2\sqrt{x^3 - 5}$ **32.** _____

33. For $y = 4x^6 - 3x^2$, find $\dfrac{d^3y}{dx^3}$. **33.** _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

34. *Business: average revenue, cost and profit*. Given revenue and cost functions $R(x) = 30x$ and $C(x) = x^{2/3} + 400,$ where x is the number of items produced and $R(x)$ and $C(x)$ are in dollars, find:

(a) The average revenue, the average cost and the average profit when x items are produced.

(b) The rate at which average cost is changing when 12 items are produced.

34. (a) _____

_____

_____

(b) _____

35. *Medicine: temperature during an illness*. The temperature *T*, in degrees Fahrenheit, of a patient taking fever-reducing medicine is given by $T = 0.17t^2 - 1.5t + 102.5,$ where *t* is time in hours.

(a) Find the rate of change of the patient's temperature with respect to time.

(b) What is the patient's temperature 3 hours after taking the medicine?

(c) Find the rate of change of the patient's temperature 3 hours after taking the fever-reducing medicine.

35. (a) _____

(b) _____

(c) _____

36. Find $(f \circ g)(x)$ and $(g \circ f)(x),$ given that $f(x) = \sqrt{x}$ and $g(x) = x^2 + 3x.$

36. _____

---

37. Differentiate $y = \sqrt{(8 - 2x)^{3/2}(4 + x)^{1/3}}$.

37. _____

38. Find $\lim\limits_{x \to -1} \dfrac{1 + x^3}{1 + x}$.

38. _____

---

39. Graph *f* and *f*′ over the given interval. Then estimate points at which the tangent line to *f* is horizontal.

$$f(x) = 2x^5 + 4x^2 - 7x; \ [-5, 5]$$

39. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.

40. Find the following limit by creating a table of values:

$$\lim_{x\to 0}\frac{\sqrt{x^2+1}-1}{x}.$$

Start with $\Delta Tbl = 0.1$ and then go to 0.01 and 0.001. When you think you know the limit, graph

$$y=\frac{\sqrt{x^2+1}-1}{x}$$

and use the TRACE feature to further verify your assertion.

40. _____

Copyright © 2012 Pearson Education, Inc. Publishing as Addison-Wesley.