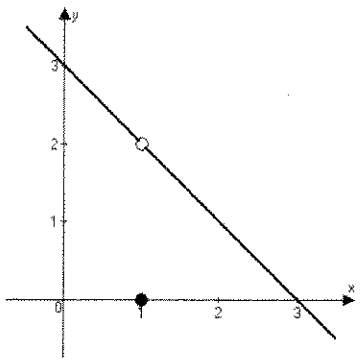
17. Let

$$f(x)=\begin{cases}3-x, & x\neq 1\\ 0 & x=1\end{cases}.$$

Determine the following limit. (Hint: Use the graph of the function.)

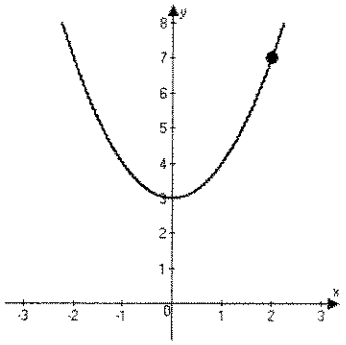
$$\lim_{x\to 1} f(x)$$



A) 2 B) 0 C) 3 D) 4 E) Does not exist

18. Determine the following limit. (Hint: Use the graph of the function.)

$$\lim_{x\to 2}\left(x^2+3\right)$$



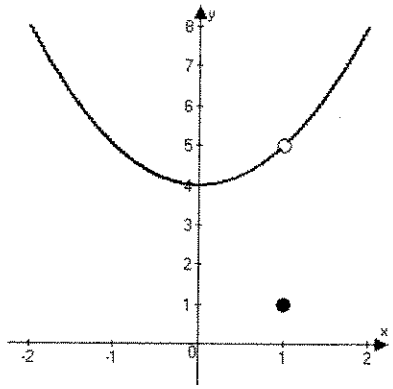
A) Does not exist B) 2 C) 3 D) 7 E) 0

19. Let

$$f(x)=\begin{cases} x^2+4, & x\neq 1 \\ 1, & x=1 \end{cases}.$$

Determine the following limit. (Hint: Use the graph of the function.)

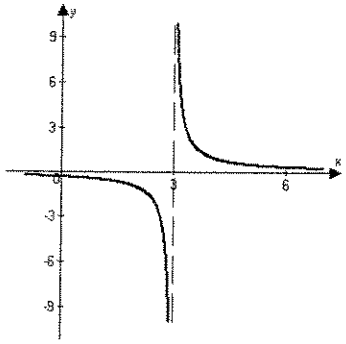
$\lim_{x\to 1} f(x)$



A) 5 B) 1 C) 4 D) 16 E) Does not exist.

20. Determine the following limit. (Hint: Use the graph of the function.)

$$\lim_{x\to 3}\frac{1}{x-3}$$



A) 0 B) Does not exist C) 3 D) –3 E) –6

21. Let $f(x)=-3x-5$ and $g(x)=x^2$. Find the limits:

(a) $\lim_{x\to -4} f(x)$ (b) $\lim_{x\to -2} g(x)$ (c) $\lim_{x\to 4} g(f(x))$

A) 12 , 4 , –23
B) –4 , –2 , 16
C) –8 , 2 , –23
D) 12 , –2 , 25
E) 7 , 4 , 289

22. Let $f(x)=x^2+1$ and $g(x)=3x$. Find the limits:

(a) $\lim_{x\to 5} f(x)$ (b) $\lim_{x\to 2} g(x)$ (c) $\lim_{x\to -3} g(f(x))$

A) 2 , 3 , –26 B) 5 , 2 , 27 C) 26 , 6 , 30 D) 5 , 2 , 1 E) 6 , 2 , –8

23. Let $f(x)=5+x^2$ and $g(x)=\sqrt{x+3}$. Find the limits:

(a) $\lim_{x\to 2} f(x)$ (b) $\lim_{x\to 5} g(x)$ (c) $\lim_{x\to 5} g(f(x))$

A) $9,\sqrt{8},\sqrt{33}$ B) $2,\sqrt{5},\sqrt{5}$ C) $6,5,\sqrt{30}$ D) $4,\sqrt{3},\sqrt{8}$ E) $6,\sqrt{5},\sqrt{33}$

24. Let $f(x)=5x^2+3x-2$ and $g(x)=\sqrt[3]{x-4}$. Find the limits:

(a) $\lim_{x\to 2} f(x)$ (b) $\lim_{x\to 2} g(x)$ (c) $\lim_{x\to 5} g(f(x))$

A) $24,\sqrt[3]{2},-\sqrt[3]{134}$
B) $28,-\sqrt[3]{2},-\sqrt[3]{134}$
C) $28,\sqrt[3]{2},\sqrt[3]{134}$
D) $24,-\sqrt[3]{2},\sqrt[3]{134}$
E) None of the above

25. Find the limit:

$$\lim_{x\to \frac{3\pi}{4}} \sin x$$

A) $-\frac{2^{1/2}}{2}$ B) $\frac{2^{1/2}}{2}$ C) $\frac{2^{-1/2}}{4}$ D) Does not exist E) $-\frac{2^{-1/2}}{4}$

26. Find the limit:

$$\lim_{x\to 5} \cos\left(\frac{\pi x}{6}\right)$$

A) $\frac{3^{-1/2}}{4}$ B) $\frac{3^{1/2}}{2}$ C) $-\frac{3^{1/2}}{2}$ D) 0 E) $-\frac{3^{-1/2}}{4}$

27. Find the limit:

$$\lim_{x\to \pi} \tan\left(\frac{5x}{6}\right)$$

A) $-3^{-1/2}$ B) $3^{-1/2}$ C) $6^{1/2}$ D) Does not exist E) $-6^{1/2}$

28. Suppose that $\lim_{x\to c} f(x) = -7$ and $\lim_{x\to c} g(x) = 4$. Find the following limit:

$\lim_{x\to c}\left[f(x)^{g(x)}\right]$

A) –11 B) –3 C) 0 D) –28 E) 2401

29. Suppose that $\lim_{x\to c} f(x) = -8$ and $\lim_{x\to c} g(x) = 7$. Find the following limit:

$\lim_{x\to c}[f(x)+g(x)]$

A) –56 B) –15 C) 0 D) –1 E) 7

30. Suppose that $\lim_{x\to c} f(x) = -9$ and $\lim_{x\to c} g(x) = 14$. Find the following limit:

$\lim_{x\to c}[f(x)-g(x)]$

A) 0 B) 5 C) –23 D) –126 E) –9

31. Suppose that $\lim_{x\to c} f(x) = -7$ and $\lim_{x\to c} g(x) = 13$. Find the following limit:

$\lim_{x\to c}[-9g(x)]$

A) –117 B) 63 C) –9 D) 13 E) –7

32. Suppose that $\lim_{x\to c} f(x) = 14$ and $\lim_{x\to c} g(x) = 15$. Find the following limit:

$\lim_{x\to c}[f(x)g(x)]$

A) 14 B) 29 C) –1 D) 210 E) –15

33. Suppose that $\lim_{x\to c} f(x) = 6$ and $\lim_{x\to c} g(x) = 9$. Find the following limit:

$\lim_{x\to c}\dfrac{f(x)}{g(x)}$

A) $\frac{3}{2}$ B) 54 C) $\frac{2}{3}$ D) Does not exist. E) –54

34. Find the following limit (if it exists). Write a simpler function that agrees with the given function at all but one point.

$\lim_{x\to -8}\dfrac{x^3+512}{x+8}$

A) 192, $x^2-8x+64$
B) 64, $x^2+8x+64$
C) 64, $x^2-8x-64$
D) Limit does not exist.
E) –192, $x^2-8x+64$

35. Find the following limit (if it exists). Write a simpler function that agrees with the given function at all but one point.

$$\lim_{x\to 14}\frac{12x^2-179x+154}{x-14}$$

A) Does not exist.
B) 179, $12x+11$
C) -179, $-12x-11$
D) -157, $-12x+11$
E) 157, $12x-11$

36. Find the limit (if it exists):

$$\lim_{x\to -8}\frac{-x-8}{x^2-64}$$

A) 32 B) $-\frac{1}{16}$ C) $\frac{1}{16}$ D) -8 E) $\frac{1}{32}$

37. Find the limit (if it exists):

$$\lim_{\Delta x\to 0}\frac{(x+\Delta x)^2-(x+\Delta x)-6-(x^2-x-6)}{\Delta x}$$

A) $\frac{1}{3}x^3-\frac{1}{2}x^2-6x$ B) x^3-x^2-6x C) 0 D) $2x-1$ E) x^2-x-6

38. Determine the limit (if it exists):

$$\lim_{x\to 0}\frac{\sin x(1-\cos x)}{-2x^8}$$

A) 0 B) 1 C) Does not exist. D) -2 E) 8

39. Determine the limit (if it exists):

$$\lim_{x\to 0}\frac{-2(1-\cos x)}{x}$$

A) 0 B) -4 C) -8 D) Does not exist E) 4

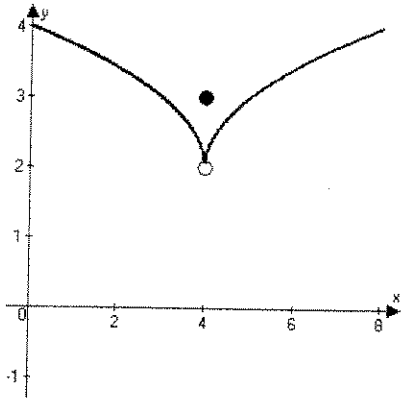
40. Determine the limit (if it exists):

$$\lim_{x\to 0}\frac{\sin^5 x}{x^4}$$

A) ∞ B) 1 C) 0 D) Does not exist. E) 2

41. Use the graph as shown to determine the following limits, and discuss the continuity of the function at $x = 4$.

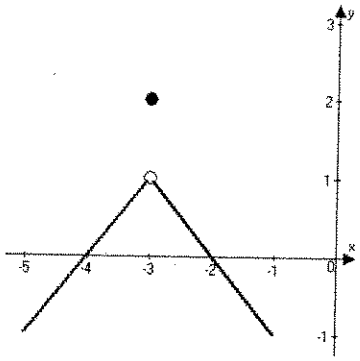
(i) $\lim_{x \to 4^+} f(x)$ (ii) $\lim_{x \to 4^-} f(x)$ (iii) $\lim_{x \to 4} f(x)$



A) 4 , 4, 4, Not continuous
B) 3 , 3 , 3 , Not continuous
C) 2 , 2 , 2 , Continuous
D) 3 , 3 , 3 , Continuous
E) 2 , 2 , 2 , Not continuous

42. Use the graph as shown to determine the following limits, and discuss the continuity of the function at $x = -3$.

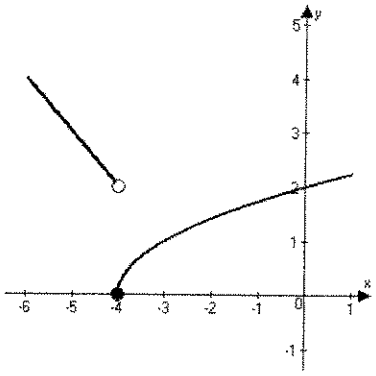
(i) $\lim_{x \to -3^+} f(x)$ (ii) $\lim_{x \to -3^-} f(x)$ (iii) $\lim_{x \to -3} f(x)$



A) 1 , 1 , 1 , Not continuous
B) 1 , 1 , 1 , Continuous
C) 2 , 2 , 2 , Not continuous
D) 2 , 2 , 2 , Continuous
E) –3 , –3 , –3 , Continuous

43. Use the graph to determine the following limits, and discuss the continuity of the function at $x = -4$.

(i) $\lim_{x \to -4^+} f(x)$ (ii) $\lim_{x \to -4^-} f(x)$ (iii) $\lim_{x \to -4} f(x)$



A) 2 , 0 , Does not exist , Not continuous
B) 0 , 2 , Does not exist , Not continuous
C) 0 , 2 , 0 , Continuous
D) –4 , 0 , Does not exist , Not continuous
E) 2 , –2 , Does not exist , Not continuous

44. Find the limit (if it exists). Note that $f(x) = \lfloor x \rfloor$ represents the greatest integer function.

$\lim_{x \to 8^+} \left(-4\lfloor x \rfloor - 7\right)$

A) 39 B) –35 C) Does not exist D) –39 E) 35

45. Find the x-values (if any) at which the function $f(x) = -3x^2 - 7x - 11$ is not continuous. Which of the discontinuitites are removable?

A) Continuous everywhere
B) $x = -11$. Removable
C) $x = -\frac{7}{6}$. Removable.
D) $x = -\frac{7}{6}$. Not removable.
E) both B and C

46. Find the x-values (if any) at which the function $f(x) = \frac{x}{x^2 + 64}$ is not continuous.

Which of the discontinuitites are removable?

A) 8 and -8. Not removable.
B) Continuous everywhere
C) 8 and -8. Removable.
D) Discontinuous everywhere
E) None of the above

47. Find the x-values (if any) at which the function $f(x)=\dfrac{x-5}{x^2-6x+5}$ is not continuous.

Which of the discontinuitites are removable?

A) No points of discontinuity.
B) $x=5$ (Not removable), $x=1$ (Removable)
C) $x=5$ (Removable), $x=1$ (Not removable)
D) No points of continuity.
E) $x=5$ (Not removable), $x=1$ (Not removable)

48. Find constants a and b such that the function

$$f(x)=\begin{cases}9, & x\le -5\\ ax+b, & -5<x<1\\ -9, & x\ge 1\end{cases}$$

is continuous on the entire real line.

A) $a=3, b=0$
B) $a=3, b=-6$
C) $a=3, b=6$
D) $a=-3, b=6$
E) $a=-3, b=-6$

49. Find the constant a such that the function

$$f(x)=\begin{cases}4\cdot\dfrac{\sin x}{x}, & x<0\\ a+15x, & x\ge 0\end{cases}$$

is continuous on the entire real line.

A) –4 B) 4 C) –15 D) 15 E) 1

50. Determine whether $f(x)=\dfrac{x^2}{x^2-81}$ approaches ∞ or $-\infty$ as x approaches –9 from the left and from the right by completing the tables below.

x	–9.5	–9.1	–9.01	–9.001
$f(x)$				

x	–8.999	–8.99	–8.9	–8.5
$f(x)$				

A) $\lim\limits_{x\to -9^-} f(x)=\infty$
B) $\lim\limits_{x\to -9^-} f(x)=-\infty$
C) $\lim\limits_{x\to -9^+} f(x)=-\infty$
D) $\lim\limits_{x\to -9^+} f(x)=\infty$
E) Both A and C
F) Both B and D

51. Find the vertical asymptotes (if any) of the function $f(x)=\dfrac{x^2-25}{x^2-15x+50}$.

A) $x=-10$ B) $x=10$ C) $x=5$ D) $x=-5$ E) $x=-50$

52. Find the vertical asymptotes (if any) of the function $f(x)=\dfrac{x^2+8x+12}{x^3+x^2-26x+24}$.

A) $x=4$ B) $x=1$ C) $x=-4$ D) $x=-1$ E) A and B F) C and D

53. Find the vertical asymptotes (if any) of the function $f(x)=\tan(-15x)$.

A) $x=\dfrac{2k+1}{30}\pi$ $(k=0,\ \pm1,\ \pm2,\ ...)$

B) $x=\dfrac{2k+1}{15}\pi$ $(k=0,\ \pm1,\ \pm2,\ ...)$

C) $x=\dfrac{2k}{15}\pi$ $(k=0,\ \pm1,\ \pm2,\ ...)$

D) No vertical asymptotes

E) $x=\dfrac{2k}{30}\pi$ $(k=0,\ \pm1,\ \pm2,\ ...)$

54. Find the limit:

$$\lim_{x\to6^+}\frac{x-8}{-x+6}$$

A) $-\infty$ B) ∞ C) 0 D) -1 E) 1

55. Find the limit:

$$\lim_{x\to12}\frac{x^2-12x}{\left(x^2+144\right)(x-12)}$$

A) -24 B) $-\dfrac{1}{24}$ C) 24 D) $\dfrac{1}{24}$ E) 12

56. Find the limit:

$$\lim_{x\to0^-}\left(x^4-\frac{1}{x}\right)$$

A) 0 B) $-\infty$ C) 1 D) -1 E) ∞