Limits Test Review

1. Evaluate the limit: $\lim_{x\to 2}\dfrac{x^2+x-6}{2-x}$.

(A) 5
(B) 3
(C) –3
(D) –5
(E) The limit does not exist.

2. Evaluate the limit, if it exists: $\lim_{x\to 9}\dfrac{\sqrt{x-5}-2}{x-9}$.

(A) $\frac{1}{4}$
(B) $-\frac{1}{4}$
(C) 1
(D) 0
(E) The limit does not exist.

3. Evaluate the limit, if it exists: $\lim_{x\to 2}\dfrac{\frac{1}{x}-\frac{1}{2}}{x-2}$.

(A) $\frac{1}{4}$
(B) $-\frac{1}{4}$
(C) 1
(D) –1
(E) The limit does not exist.

4. Evaluate the limit, if it exists: $\lim_{x\to 1}\dfrac{\tan^{-1}x}{\sin^{-1}x+1}$.

(A) 0
(B) $\frac{1}{4}$
(C) $\frac{1}{2}$
(D) $\frac{\pi}{2}$
(E) $\frac{\pi}{2\pi+4}$

6. Given the function:
$f(x)=\begin{cases}\sin 2x, & x\le\pi\\ 2x+k, & x>\pi\end{cases}$
what value of k will make this piecewise function continuous?
(A) -2π
(B) $-\pi$
(C) 0
(D) π
(E) 2π

7. Find the limit: $\lim_{x\to 0} x\left(e^x+\dfrac{1}{x}\right)$.

(A) 0
(B) 1
(C) 2
(D) The limit does not exist.
(E) None of these

8. Identify the vertical asymptotes for $f(x)=\dfrac{x^2+3x-4}{x^2+x-2}$.
(A) $x=-2, x=1$
(B) $x=-2$
(C) $x=1$
(D) $y=-2, y=1$
(E) $y=-2$

10. How many vertical asymptotes exist for the function $f(x)=\dfrac{1}{2\sin^2 x-\sin x-1}$ in the open interval $0<x<2\pi$?
(A) 0
(B) 1
(C) 2
(D) 3
(E) 4

6. $\lim_{x\to\infty}\frac{4-x^2}{4x^2-x-2}$ is
(A) –2 (B) $-\frac{1}{4}$ (C) 1 (D) 2 (E) nonexistent

23. If $\begin{cases}f(x)=\frac{x^2-x}{2x} \text{ for } x\neq 0,\\ f(0)=k,\end{cases}$
and if f is continuous at $x=0$, then $k=$
(A) –1 (B) $-\frac{1}{2}$ (C) 0 (D) $\frac{1}{2}$ (E) 1

14. The graph of $y=\dfrac{x^2-9}{3x-9}$ has
(A) a vertical asymptote at $x=3$
(B) a horizontal asymptote at $y=\frac{1}{3}$
(C) a removable discontinuity at $x=3$
(D) an infinite discontinuity at $x=3$
(E) none of these

17. Which statement is true about the curve $y = \dfrac{2x^2+4}{2+7x-4x^2}$?

(A) The line $x = -\frac{1}{4}$ is a vertical asymptote.
(B) The line $x = 1$ is a vertical asymptote.
(C) The line $y = -\frac{1}{4}$ is a horizontal asymptote.
(D) The graph has no vertical or horizontal asymptote.
(E) The line $y = 2$ is a horizontal asymptote.

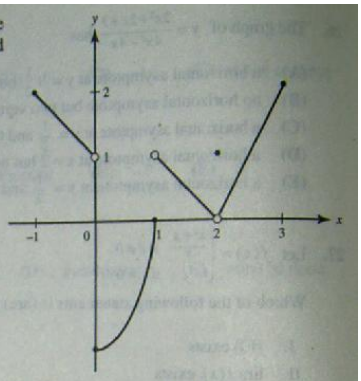
24. Suppose $\begin{cases} f(x) = \frac{3x(x-1)}{x^2-3x+2} \text{ for } x \neq 1, 2, \\ f(1) = -3, \\ f(2) = 4. \end{cases}$

Then $f(x)$ is continuous

(A) except at $x = 1$ (B) except at $x = 2$ (C) except at $x = 1$ or 2
(D) except at $x = 0$, 1, or 2 (E) at each real number

Questions 32–36 are based on the function f shown in the graph and defined below:

$$f(x) = \begin{cases} 1-x & (-1 \le x < 0) \\ 2x^2-2 & (0 \le x \le 1) \\ -x+2 & (1 < x < 2) \\ 1 & (x = 2) \\ 2x-4 & (2 < x \le 3) \end{cases}$$



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

(A) equals 0 (B) equals 1 (C) equals 2
(D) does not exist (E) none of these

33. The function f is defined on $[-1,3]$

(A) if $x \neq 0$ (B) if $x \neq 1$ (C) if $x \neq 2$
(D) if $x \neq 3$ (E) at each x in $[-1,3]$

34. The function f has a removable discontinuity at

(A) $x = 0$ (B) $x = 1$ (C) $x = 2$ (D) $x = 3$ (E) none of these

36. If $a \neq 0$, then $\lim_{x \to a} \dfrac{x^3 - a^3}{a^6 - x^6}$ is

(A) nonexistent. (B) 0. (C) $-\dfrac{1}{2a^3}$.
(D) $-\dfrac{1}{a^3}$. (E) $\dfrac{1}{2a^3}$.

47. ***Continuous Function*** Find a value for a so that the function

$$f(x) = \begin{cases} x^2 - 1, & x < 3 \\ 2ax, & x \ge 3 \end{cases}$$

is continuous.

48. ***Continuous Function*** Find a value for a so that the function

$$f(x) = \begin{cases} 2x + 3, & x \le 2 \\ ax + 1, & x > 2 \end{cases}$$

is continuous.

49. ***Continuous Function*** Find a value for a so that the function

$$f(x) = \begin{cases} 4 - x^2, & x < -1 \\ ax^2 - 1, & x \ge -1 \end{cases}$$

is continuous.

50. ***Continuous Function*** Find a value for a so that the function

$$f(x) = \begin{cases} x^2 + x + a, & x < 1 \\ x^3, & x \ge 1 \end{cases}$$

is continuous.