AP Calculus

Chapter 2 Limits and Continuity Review

Answer these questions without a calculator.

1. $\lim_{x\to 2} \frac{x^2-4}{x^2+4}$ is

(A) 1 **(B)** 0 **(C)** $-\frac{1}{2}$ **(D)** –1 **(E)** ∞

2. $\lim_{x\to \infty} \frac{4-x^2}{x^2-1}$ is

(A) 1 **(B)** 0 **(C)** –4 **(D)** –1 **(E)** ∞

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

(A) 0 **(B)** 1 **(C)** $\frac{1}{4}$ **(D)** ∞ **(E)** none of these

4. $\lim_{x\to 0} \frac{x}{x}$ is

(A) 1 **(B)** 0 **(C)** ∞ **(D)** –1 **(E)** nonexistent

5. $\lim_{x\to 2} \frac{x^3-8}{x^2-4}$ is

(A) 4 **(B)** 0 **(C)** 1 **(D)** 3 **(E)** ∞

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

11. $\lim_{x\to 0} \frac{\sin 5x}{x}$

(A) $=0$ **(B)** $=\frac{1}{5}$ **(C)** $=1$ **(D)** $=5$ **(E)** does not exist

12. $\lim_{x\to 0} \frac{\sin 2x}{3x}$

(A) $=0$ **(B)** $=\frac{2}{3}$ **(C)** $=1$ **(D)** $=\frac{3}{2}$ **(E)** does not exist

14. The graph of $y=\frac{x^2-9}{3x-9}$ 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

16. $\lim_{x\to 0} \sin\frac{1}{x}$ is

(A) ∞ **(B)** 1 **(C)** nonexistent **(D)** -1 **(E)** none of these

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

(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.

18. $\lim_{x\to\infty} \frac{2x^2+1}{(2-x)(2+x)}$ is

(A) -4 **(B)** -2 **(C)** 1 **(D)** 2 **(E)** nonexistent

19. $\lim_{x\to 0} \frac{|x|}{x}$ is

(A) 0 **(B)** nonexistent **(C)** 1 **(D)** -1 **(E)** none of these

22. Let $f(x)=\begin{cases}\dfrac{x^2-1}{x-1} & \text{if } x\neq 1\\ 4 & \text{if } x=1.\end{cases}$

Which of the following statements is (are) true?

I. $\lim\limits_{x\to 1} f(x)$ exists

II. $f(1)$ exists

III. f is continuous at $x=1$

(A) I only **(B)** II only **(C)** I and II
(D) none of them **(E)** all of them

23. If $\begin{cases}f(x)=\dfrac{x^2-x}{2x} \text{ for } x\neq 0,\\ f(0)=k,\end{cases}$
and if f is continuous at $x=0$, then $k=$

(A) -1 **(B)** $-\dfrac{1}{2}$ **(C)** 0 **(D)** $\dfrac{1}{2}$ **(E)**

25. The graph of $f(x)=\dfrac{4}{x^2-1}$ has

(A) one vertical asymptote, at $x=1$
(B) the y-axis as vertical asymptote
(C) the x-axis as horizontal asymptote and $x=\pm 1$ as vertical asymptotes
(D) two vertical asymptotes, at $x=\pm 1$, but no horizontal asymptote
(E) no asymptote

27. Let $f(x)=\begin{cases}\dfrac{x^2+x}{x} & \text{if } x\neq 0\\ 1 & \text{if } x=0\end{cases}$.

Which of the following statements is (are) true?

I. $f(0)$ exists

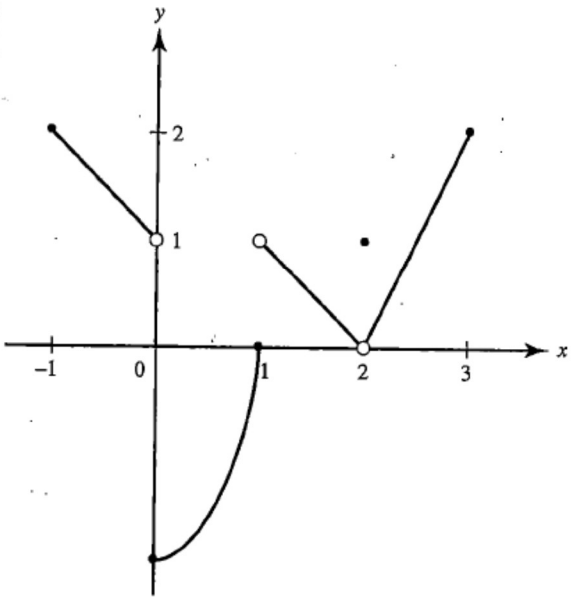
II. $\lim\limits_{x\to 0} f(x)$ exists

III. f is continuous at $x=0$

(A) I only **(B)** II only **(C)** I and II only
(D) all of them **(E)** none of them

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

35. On which of the following intervals is f continuous?

(A) $-1\le x\le 0$ **(B)** $0<x<1$ **(C)** $1\le x\le 2$
(D) $2\le x\le 3$ **(E)** none of these

36. The function f has a jump discontinuity at

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

Answers

1	B	11	D	19	B	33	E
2	D	12	B	22	C	34	C
3	C	14	C	23	B	35	B
4	A	16	C	25	C	36	B
5	D	17	A	27	D		
6	B	18	B	32	A		