Chapter 2 – AP Calc MC Questions

EVAULATING LIMITS

5. $\lim_{n\to\infty} \frac{4n^2}{n^2+10,000n}$ is

A

(A) 0 (B) $\frac{1}{2,500}$ (C) 1 (D) 4 (E) nonexistent

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3. $\lim_{n\to\infty} \frac{3n^3-5n}{n^3-2n^2+1}$ is

D

(A) -5 (B) -2 (C) 1 (D) 3 (E) nonexistent

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21. $\lim_{x\to 1} \frac{x}{\ln x}$ is

E

(A) 0 (B) $\frac{1}{e}$ (C) 1 (D) e (E) nonexistent

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83. If $a \neq 0$, then $\lim_{x\to a} \frac{x^2-a^2}{x^4-a^4}$ is

B

(A) $\frac{1}{a^2}$ (B) $\frac{1}{2a^2}$ (C) $\frac{1}{6a^2}$ (D) 0 (E) nonexistent

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6. $\lim_{x\to\infty} \frac{x^3-2x^2+3x-4}{4x^3-3x^2+2x-1} =$

C

(A) 4 (B) 1 (C) $\frac{1}{4}$ (D) 0 (E) -1

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12. If $f(x) = \begin{cases} \ln x & \text{for } 0 < x \le 2 \\ x^2 \ln 2 & \text{for } 2 < x \le 4, \end{cases}$ then $\lim_{x\to 2} f(x)$ is

E

(A) $\ln 2$ (B) $\ln 8$ (C) $\ln 16$ (D) 4 (E) nonexistent

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1. $\lim_{x\to\infty} \frac{(2x-1)(3-x)}{(x-1)(x+3)}$ is

B

(A) -3 (B) -2 (C) 2 (D) 3 (E) nonexistent

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5. $\lim_{x\to 0}\dfrac{5x^4+8x^2}{3x^4-16x^2}$ is

A

(A) $-\dfrac{1}{2}$ (B) 0 (C) 1 (D) $\dfrac{5}{3}+1$ (E) nonexistent

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2. $\lim_{x\to 0}\dfrac{2x^6+6x^3}{4x^5+3x^3}$ is

D

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

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2. If $f(x)=2x^2+1$, then $\lim_{x\to 0}\dfrac{f(x)-f(0)}{x^2}$ is

C

(A) 0 (B) 1 (C) 2 (D) 4 (E) nonexistent

CONTINUITY

3. If $\begin{cases} f(x) = \dfrac{\sqrt{2x+5} - \sqrt{x+7}}{x-2}, & \text{for } x \neq 2, \\ f(2) = k \end{cases}$ and if f is continuous at $x = 2$, then $k =$

B

(A) 0 (B) $\frac{1}{6}$ (C) $\frac{1}{3}$ (D) 1 (E) $\frac{7}{5}$

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10. Which of the following functions are continuous at $x = 1$?

I. $\ln x$

II. e^x

III. $\ln(e^x - 1)$

E

(A) I only (B) II only (C) I and II only (D) II and III only (E) I, II, and III

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5. If the function f is continuous for all real numbers and if $f(x) = \dfrac{x^2 - 4}{x+2}$ when $x \neq -2$, then $f(-2) =$

A

(A) -4 (B) -2 (C) -1 (D) 0 (E) 2

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79. Let f be the function given by $f(x) = \dfrac{(x-1)(x^2-4)}{x^2 - a}$. For what positive values of a is f continuous for all real numbers x?

A

(A) None
(B) 1 only
(C) 2 only
(D) 4 only
(E) 1 and 4 only

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29. Which of the following functions are continuous for all real numbers x?

I. $y = x^{\frac{2}{3}}$

II. $y = e^x$

III. $y = \tan x$

D

(A) None (B) I only (C) II only (D) I and II (E) I and III

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5. Let f be the function defined by the following.

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

C

For what values of x is f NOT continuous?

(A) 0 only (B) 1 only (C) 2 only (D) 0 and 2 only (E) 0, 1, and 2

$$f(x)=\begin{cases}x^2-3x+9 & \text{for } x\le 2\\ kx+1 & \text{for } x>2\end{cases}$$

3. The function f is defined above. For what value of k, if any, is f continuous at $x=2$?

C

(A) 1

(B) 2

(C) 3

(D) 7

(E) No value of k will make f continuous at $x=2$.

HORIZONTAL AND VERTICAL ASYMPTOTES

35. If the graph of $y=\dfrac{ax+b}{x+c}$ has a horizontal asymptote $y=2$ and a vertical asymptote $x=-3$, then $a+c=$

E

(A) -5 (B) -1 (C) 0 (D) 1 (E) 5

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3. For $x \geq 0$, the horizontal line $y = 2$ is an asymptote for the graph of the function f. Which of the following statements must be true?

(A) $f(0) = 2$

(B) $f(x) \neq 2$ for all $x \geq 0$

(C) $f(2)$ is undefined.

(D) $\lim\limits_{x\to 2} f(x) = \infty$

(E) $\lim\limits_{x\to\infty} f(x) = 2$

E

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19. What are all horizontal asymptotes of the graph of $y=\dfrac{5+2^x}{1-2^x}$ in the xy-plane?

(A) $y=-1$ only

(B) $y=0$ only

(C) $y=5$ only

(D) $y=-1$ and $y=0$

(E) $y=-1$ and $y=5$

E

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42. The graph of which of the following equations has $y=1$ as an asymptote?

(A) $y=\ln x$ (B) $y=\sin x$ (C) $y=\dfrac{x}{x+1}$ (D) $y=\dfrac{x^2}{x-1}$ (E) $y=e^{-x}$

C

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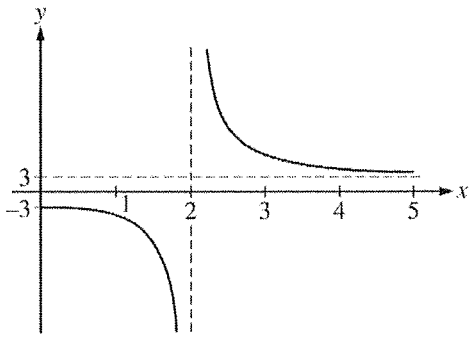
5. If $f(x)=e^x$, which of the following lines is an asymptote to the graph of f?

(A) $y=0$ (B) $x=0$ (C) $y=x$ (D) $y=-x$ (E) $y=1$

A



10. The function f is given by $f(x) = \dfrac{ax^2 + 12}{x^2 + b}$. The figure above shows a portion of the graph of f. Which of the following could be the values of the constants a and b?

D

(A) $a = -3,\ b = 2$

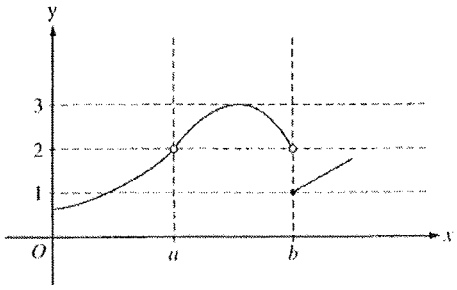
(B) $a = 2,\ b = -3$

(C) $a = 2,\ b = -2$

(D) $a = 3,\ b = -4$

(E) $a = 3,\ b = 4$

LIMITS – GRAPHICALLY



15. The graph of the function f is shown in the figure above. Which of the following statements about f is true?

B

(A) $\lim_{x\to a} f(x) = \lim_{x\to b} f(x)$

(B) $\lim_{x\to a} f(x) = 2$

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

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

(E) $\lim_{x\to a} f(x)$ does not exist.

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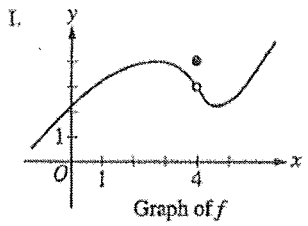
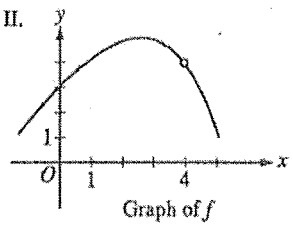
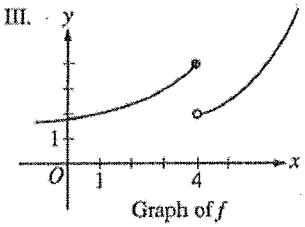
79. For which of the following does $\lim_{x\to 4} f(x)$ exist?



Graph of f



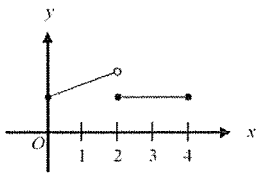
Graph of f



Graph of f

D

(A) I only
(B) II only
(C) III only
(D) I and II only
(E) I and III only



Graph of f

C

77. The figure above shows the graph of a function f with domain $0 \le x \le 4$. Which of the following statements are true?

I. $\lim_{x\to 2^-} f(x)$ exists.

II. $\lim_{x\to 2^+} f(x)$ exists.

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

(A) I only (B) II only (C) I and II only (D) I and III only (E) I, II, and III

MISCELLANEOUS

41. If $\lim_{x \to a} f(x) = L$, where L is a real number, which of the following must be true?

(A) $f'(a)$ exists.

(B) $f(x)$ is continuous at $x = a$.

(C) $f(x)$ is defined at $x = a$.

(D) $f(a) = L$

(E) None of the above

E

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81. Let f be a continuous function on the closed interval $[-3, 6]$. If $f(-3) = -1$ and $f(6) = 3$, then the Intermediate Value Theorem guarantees that

(A) $f(0) = 0$

(B) $f'(c) = \frac{4}{9}$ for at least one c between -3 and 6

(C) $-1 \le f(x) \le 3$ for all x between -3 and 6

(D) $f(c) = 1$ for at least one c between -3 and 6

(E) $f(c) = 0$ for at least one c between -1 and 3

D
