

1.  $\lim_{x \rightarrow 2} \frac{x^2 + x - 6}{x^2 - 4}$  is

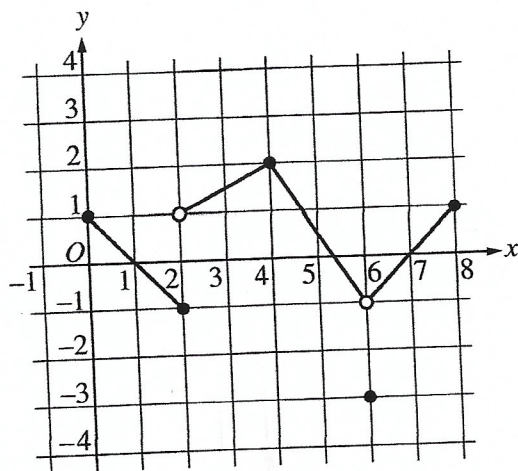
- (A)  $-\frac{1}{4}$       (B) 0      (C) 1      (D)  $\frac{5}{4}$       (E) nonexistent
- 

2. If  $f(x) = x^3 - x^2 + x - 1$ , then  $f'(2) =$

- (A) 10      (B) 9      (C) 7      (D) 5      (E) 3
- 

3.  $\lim_{x \rightarrow 0} \frac{x^2}{1 - \cos x}$  is

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



5. The figure above shows the graph of the function  $f$ . Which of the following statements are true?

- I.  $\lim_{x \rightarrow 2^-} f(x) = f(2)$
- II.  $\lim_{x \rightarrow 6^-} f(x) = \lim_{x \rightarrow 6^+} f(x)$
- III.  $\lim_{x \rightarrow 6} f(x) = f(6)$

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

7.  $\lim_{x \rightarrow \infty} \frac{x^3}{e^{3x}}$  is

- (A) 0
- (B)  $\frac{2}{9}$
- (C)  $\frac{2}{3}$
- (D) 1
- (E) infinite

9. Let  $f$  be the function given by  $f(x) = \frac{(x-2)^2(x+3)}{(x-2)(x+1)}$ . For which of the following values of  $x$  is  $f$  not continuous?

- (A)  $-3$  and  $-1$  only
  - (B)  $-3$ ,  $-1$ , and  $2$
  - (C)  $-1$  only
  - (D)  $-1$  and  $2$  only
  - (E)  $2$  only
- 

12. For which of the following does  $\lim_{x \rightarrow \infty} f(x) = 0$ ?

I.  $f(x) = \frac{\ln x}{x^{99}}$

II.  $f(x) = \frac{e^x}{\ln x}$

III.  $f(x) = \frac{x^{99}}{e^x}$

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

14. If  $a$  and  $b$  are positive constants, then  $\lim_{x \rightarrow \infty} \frac{\ln(bx+1)}{\ln(ax^2+3)} =$

- (A)  $0$       (B)  $\frac{1}{2}$       (C)  $\frac{1}{2}ab$       (D)  $2$       (E)  $\infty$
-

16.  $\lim_{x \rightarrow 3^-} \frac{|x-3|}{x-3}$  is
- (A) -3      (B) -1      (C) 1      (D) 3      (E) nonexistent
- 

17. If  $\lim_{h \rightarrow 0} \frac{\arcsin(a+h) - \arcsin(a)}{h} = 2$ , which of the following could be the value of  $a$ ?
- (A)  $\frac{\sqrt{2}}{2}$       (B)  $\frac{\sqrt{3}}{2}$       (C)  $\sqrt{3}$       (D)  $\frac{1}{2}$       (E) 2
- 

$$f(x) = \begin{cases} 3x + 5 & \text{when } x < -1 \\ -x^2 + 3 & \text{when } x \geq -1 \end{cases}$$

23. If  $f$  is the function defined above, then  $f'(-1)$  is
- (A) -3      (B) -2      (C) 2      (D) 3      (E) nonexistent
- 

24. Let  $f$  be the function defined by  $f(x) = \frac{(3x+8)(5-4x)}{(2x+1)^2}$ . Which of the following is a horizontal asymptote to

the graph of  $f$ ?

- (A)  $y = -6$   
(B)  $y = -3$   
(C)  $y = -\frac{1}{2}$   
(D)  $y = 0$   
(E)  $y = \frac{3}{2}$
-

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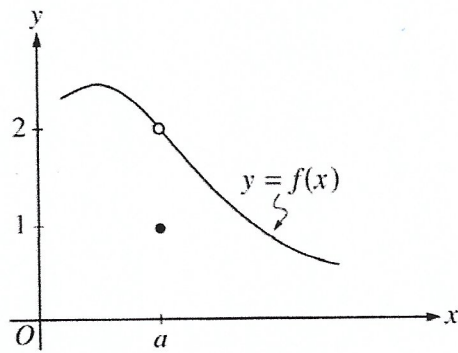
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-



84. The graph of a function  $f$  is shown in the figure above. Which of the following statements is true?

- (A)  $f(a) = 2$
- (B)  $f$  is continuous at  $x = a$ .
- (C)  $\lim_{x \rightarrow a} f(x) = 1$
- (D)  $\lim_{x \rightarrow a} f(x) = 2$
- (E)  $\lim_{x \rightarrow a} f(x)$  does not exist.