

1. Which of the following is continuous at  $x = 0$  ?

- I.  $f(x) = |x|$
- II.  $f(x) = e^x$
- III.  $f(x) = \ln(e^x - 1)$

- A) I only
  - B) II only
  - C) I and II only
  - D) II and III only
  - E) none of these
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2. The graph of a function  $f$  is reflected across the  $x$ -axis and then shifted up 2 units. Which of the following describes this transformation on  $f$  ?

- A)  $-f(x)$
  - B)  $f(x) + 2$
  - C)  $-f(x + 2)$
  - D)  $-f(x - 2)$
  - E)  $-f(x) + 2$
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3. Which of the following functions is *not* continuous for all real numbers  $x$  ?

- A)  $f(x) = x^{1/3}$
- B)  $f(x) = \frac{2}{(x + 1)^4}$
- C)  $f(x) = |x + 1|$
- D)  $f(x) = \sqrt{1 + e^x}$
- E)  $f(x) = \frac{x - 3}{x^2 + 9}$

4.  $\lim_{x \rightarrow 1} \frac{\ln x}{x}$  is

- A) 1
  - B) 0
  - C)  $e$
  - D)  $-e$
  - E) nonexistent
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5.  $\lim_{x \rightarrow 0} \left( \frac{1}{x} + \frac{1}{x^2} \right) =$

- A) 0
  - B)  $\frac{1}{2}$
  - C) 1
  - D) 2
  - E)  $\infty$
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6.  $\lim_{x \rightarrow \infty} \frac{x^3 - 4x + 1}{2x^3 - 5} =$

- A)  $-\frac{1}{5}$
- B)  $\frac{1}{2}$
- C)  $\frac{2}{3}$
- D) 1
- E) Does not exist

7. For what value of  $k$  does  $\lim_{x \rightarrow 4} \frac{x^2 - x + k}{x - 4}$  exist?

- A)  $-12$
  - B)  $-4$
  - C)  $3$
  - D)  $7$
  - E) No such value exists.
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8.  $\lim_{x \rightarrow 0} \frac{\tan x}{x} =$

- A)  $-1$
  - B)  $-\frac{1}{2}$
  - C)  $0$
  - D)  $\frac{1}{2}$
  - E)  $1$
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9. Suppose  $f$  is defined as

$$f(x) = \begin{cases} \frac{|x| - 2}{x - 2} & x \neq 2 \\ k & x = 2. \end{cases}$$

Then the value of  $k$  for which  $f(x)$  is continuous for all real values of  $x$  is  $k =$

- A)  $-2$
- B)  $-1$
- C)  $0$
- D)  $1$
- E)  $2$

10. The average rate of change of  $f(x) = x^3$  over the interval  $[a, b]$  is

- A)  $3b + 3a$
  - B)  $b^2 + ab + a^2$
  - C)  $\frac{b^2 + a^2}{2}$
  - D)  $\frac{b^3 - a^3}{2}$
  - E)  $\frac{b^4 - a^4}{4(b - a)}$
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11. The function

$$G(x) = \begin{cases} x - 5 & x > 2 \\ -5 & x = 2 \\ 5x - 13 & x < 2 \end{cases}$$

is not continuous at  $x = 2$  because

- A)  $G(2)$  is not defined.
  - B)  $\lim_{x \rightarrow 2} G(x)$  does not exist.
  - C)  $\lim_{x \rightarrow 2} G(x) \neq G(2)$ .
  - D)  $G(2) \neq -5$ .
  - E) None of the above
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12.  $\lim_{x \rightarrow -2} \frac{\sqrt{2x+5} - 1}{x+2} =$

- A) 1
- B) 0
- C)  $\infty$
- D)  $-\infty$
- E) does not exist