

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
-

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) $-f(x) + 2$
-

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
-

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) ∞
-

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.
-

8. $\lim_{x \rightarrow 0} \frac{\tan x}{x} =$

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

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) $\frac{b^4 - a^4}{4(b - a)}$
-

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
-

12. $\lim_{x \rightarrow -2} \frac{\sqrt{2x+5} - 1}{x+2} =$

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

13. The Intermediate Value Theorem states that given a continuous function f defined on the closed interval $[a, b]$ for which 0 is between $f(a)$ and $f(b)$, there exists a point c between a and b such that

- A) $c = a - b$
 - B) $f(a) = f(b)$
 - C) $f(c) = 0$
 - D) $f(0) = c$
 - E) $c = 0$
-

14. The function $t(x) = 2^x - \frac{|x-3|}{x-3}$ has

- A) a removable discontinuity at $x = 3$.
 - B) an infinite discontinuity at $x = 3$.
 - C) a jump discontinuity at $x = 3$.
 - D) no discontinuities.
 - E) a removable discontinuity at $x = 0$ and an infinite discontinuity at $x = 3$.
-

15. Find the values of c so that the function

$$h(x) = \begin{cases} c^2 - x^2 & x < 2 \\ x + c & x \geq 2 \end{cases}$$

is continuous everywhere.

- A) $-3, -2$
- B) $2, 3$
- C) $-2, 3$
- D) $-3, 2$
- E) There are no such values.