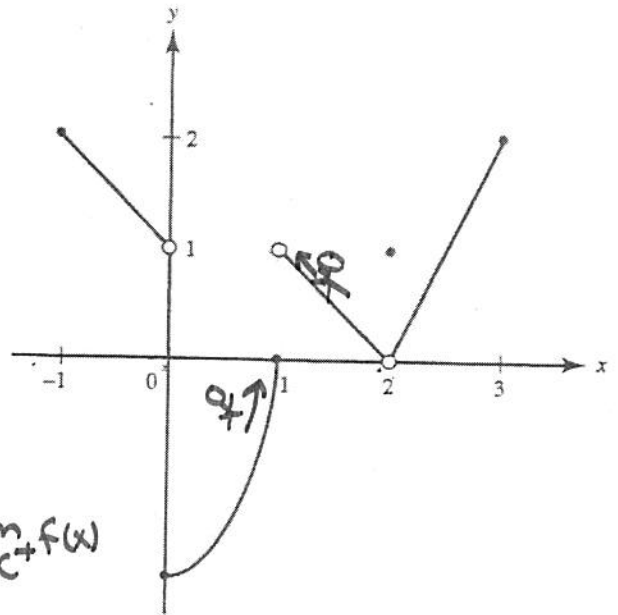


Continuity (Removable & Non-Removable) – Multiple Choice

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

- (A) $-1 \leq x \leq 0$ → no jumps, holes or asymptotes
 (B) $0 < x < 1$ → hole @ $x=0$
 (C) $1 \leq x \leq 2$ → hole @ $x=1, 2$
 (D) $2 \leq x \leq 3$ → hole @ $x=2$
 (E) none of these



2. The function f has a jump discontinuity at

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

→ $\lim_{x \rightarrow c^-} f(x) \neq \lim_{x \rightarrow c^+} f(x)$

3. The function f has a removable discontinuity at

- (A) $x = 0$
 (B) $x = 1$
 (C) $x = 2$
 (D) $x = 3$
 (E) none of these

→ HOLE $\lim_{x \rightarrow 2} f(x) \neq f(2)$

4. 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

$$y = \frac{(x-3)(x+3)}{3(x-3)}$$

↓
removable discont
@ $x=3$
(HOLE)

5. The function $f(x) = \begin{cases} x^2 & x \neq 0 \\ x & x = 0 \end{cases} \rightarrow f(x) = \begin{cases} x & x \neq 0 \\ 0 & x = 0 \end{cases}$

(A) is continuous everywhere

(B) is continuous except at $x = 0$

(C) has a removable discontinuity at $x = 0$

(D) has an infinite discontinuity at $x = 0$

(E) has $x = 0$ as a vertical asymptote

$$f(0) = 0$$

$$\lim_{x \rightarrow 0} f(x) = 0$$

$$\lim_{x \rightarrow 0} f(x) = f(0), \text{ so}$$

6. Suppose $\lim_{x \rightarrow -3^-} f(x) = -1$, $\lim_{x \rightarrow -3^+} f(x) = -1$, and $f(-3)$ is not defined.

Which of the following statements is (are) true?

✓ I. $\lim_{x \rightarrow -3} f(x) = -1$ TRUE, b/c $\lim_{x \rightarrow -3^-} f(x) = \lim_{x \rightarrow -3^+} f(x) = -1$

might be true

✗ II. f is continuous everywhere except at $x = -3$.

$f(-3)$ DNE, so

discont @ $x = -3$

✓ III. f has a removable discontinuity at $x = -3$.

→ hole @ $x = -3$

$$\lim_{x \rightarrow -3} f(x) \neq f(-3)$$

(A) None of them

(B) I only

(C) III only

(D) I and III only

(E) All of them