Station 3

AP Style Questions

42. $\lim_{x\to 0}(1+2x)^{\csc x} =$

(A) 0
(B) 1
(C) 2
(D) $e$
(E) $e^2$

using limit properties

$x \to 0 \quad (1+2x) \to 1 \qquad 1^\infty = \boxed{1}$

$x \to 0 \quad \frac{1}{\csc x} \to \frac{1}{\text{close to zero}} = \infty$

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

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

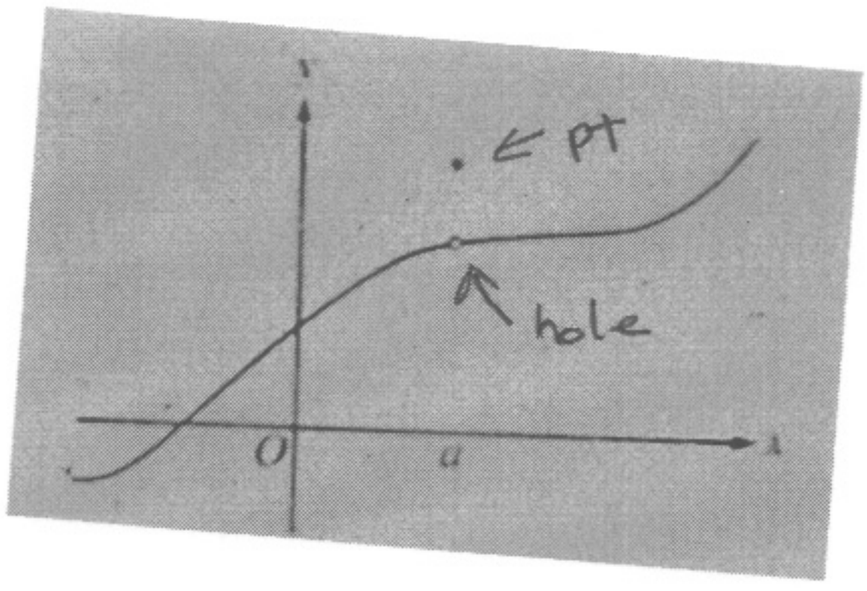
$\frac{3n^3}{n^3} \quad \omega \; n \to \infty \quad \boxed{3}$

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

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

$\ln(2) \neq (2^2)\ln(2)$

DNE




76. The graph of a function f is shown above. Which of the following statements about f is false?

(A) $f$ is continuous at $x = a$

(B) $f$ has a relative maximum at $x = a$

(C) $x = a$ is in the domain of $f$

(D) $\lim_{x \to a^+} f(x)$ is equal to $\lim_{x \to a^-} f(x)$

(E) $\lim_{x \to a} f(x)$ exists

VA = $x = 1$ or $x = -1$

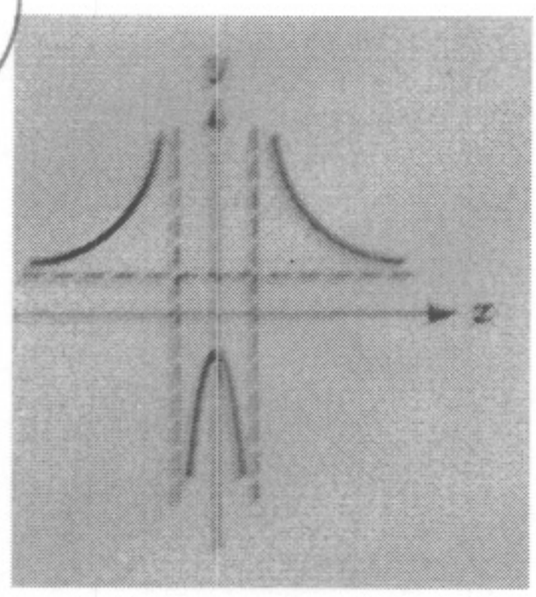
HA = $x \to \infty$ $\frac{x}{x} = 1$

7. Which one of the following graphs resemble $y = \frac{|x|+1}{|x|-1}$ ?

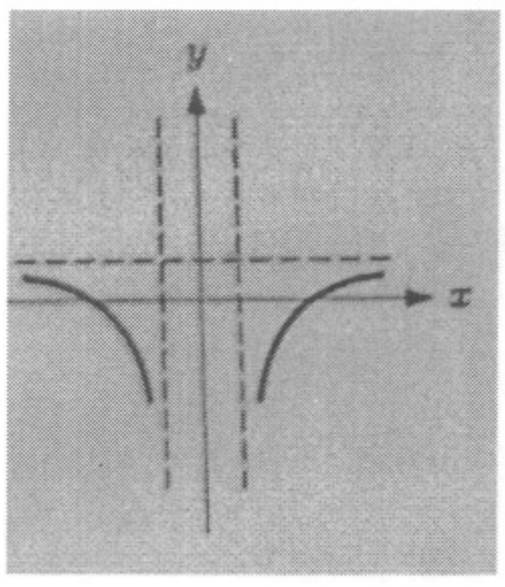
$x = -3$ $\frac{3+1}{3-1} = \frac{4}{2} = 2$

$y = 3$ $\frac{4}{2} = 2$

(A)




(B)

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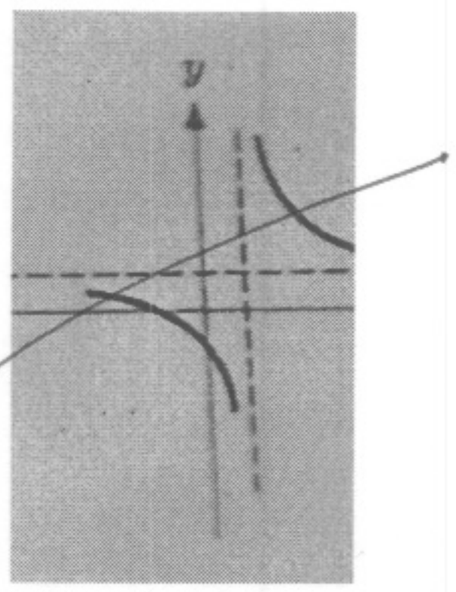
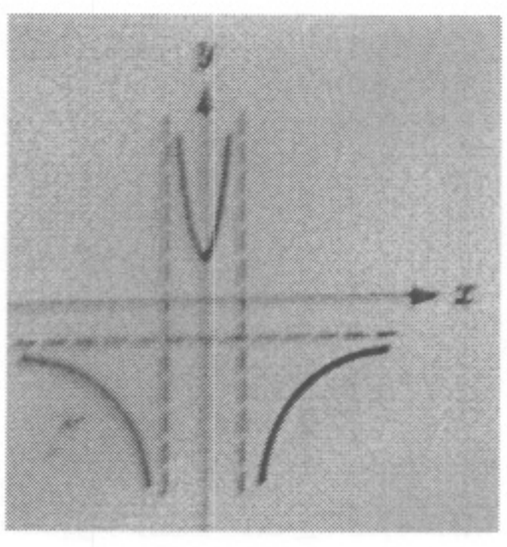
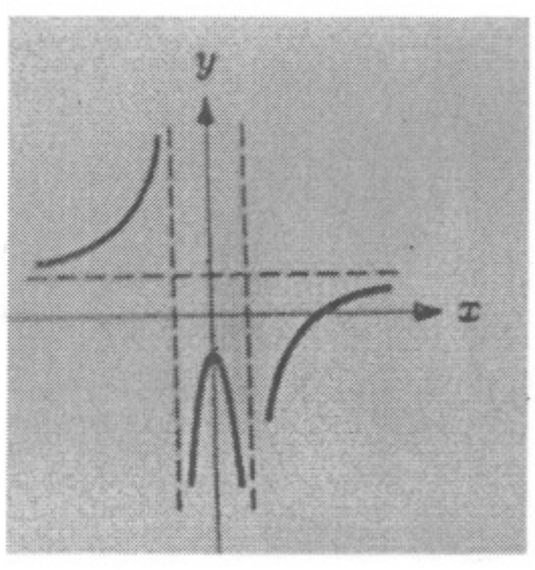
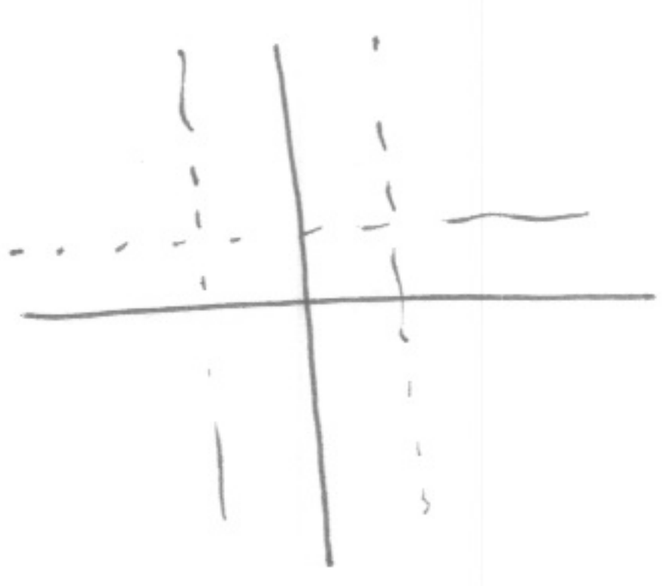


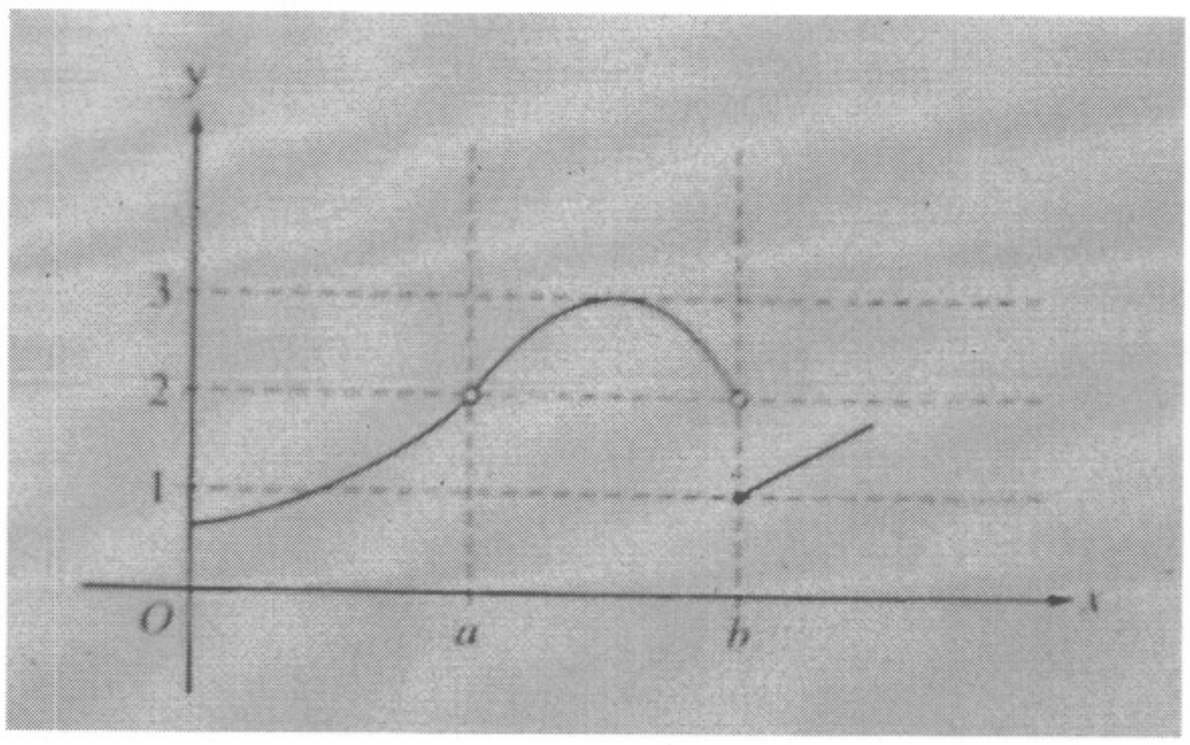

(D)




(E)






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

(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 exists

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

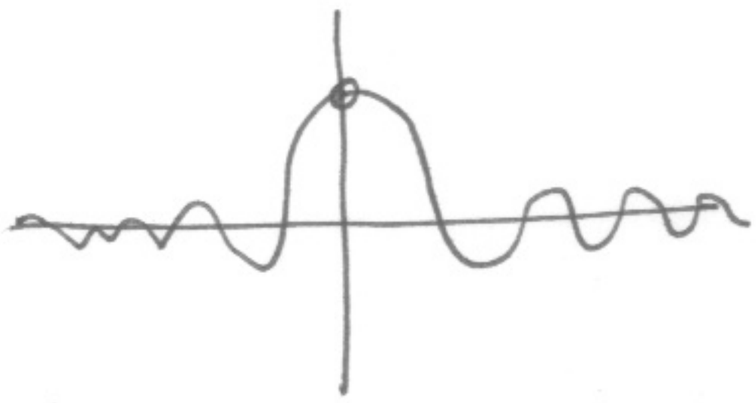
(A) 0

(B) $\frac{1}{e}$

(C) 1

(D) e

(E) nonexistent



5. The graph of $y = \frac{\sin x}{x}$ has

I. A vertical asymptote at $x = 0$

II. A horizontal asymptote at $y = 0$

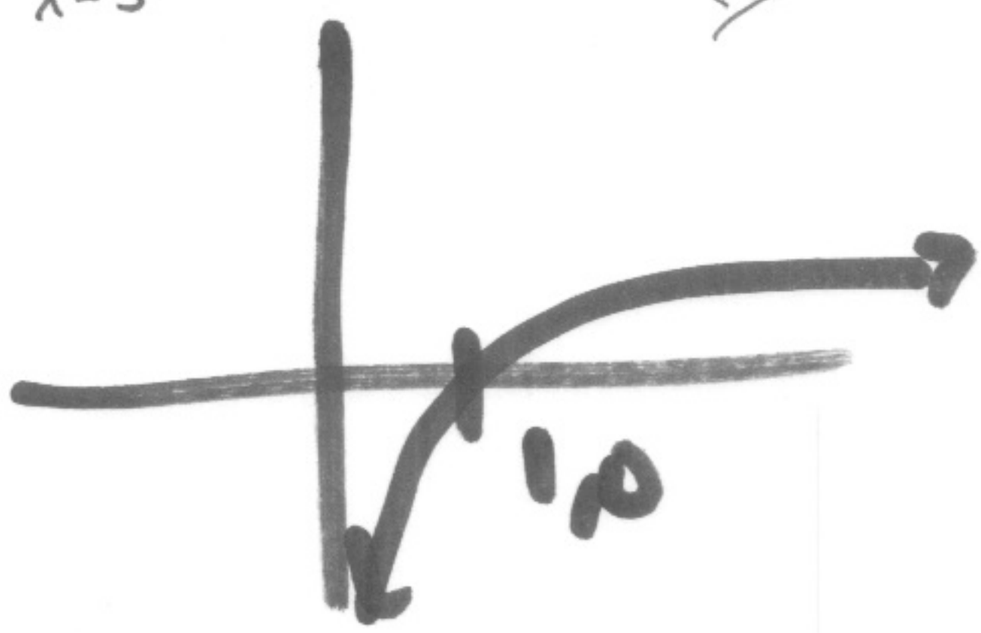
III. A infinite number of zeros

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

$\lim_{x\to 3} \frac{(3-x)(3-x)}{x-3} = \lim_{x\to 3} \frac{(-1)(x-3)(3-x)}{(x-3)} = 0$

2. $\lim_{x\to 3} \frac{(3-x)^2}{(x-3)}$ is

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




34. Which of the following functions grow faster than $e^x$ as $x \to \infty$ ?

(A) $x^4$ ← $e^x$ if faster
(B) $\ln x$ ← logs grow slow
(C) $e^{-x}$ ← $e^{-x}$ as $x\to\infty$ $e^{-x}\to 0$
(D) $3^x$
(E) $\frac{1}{2}e^x$ ← $\frac{1}{2}$ as slow than $e^x$

$e \approx 2.718$

$3^x$ has a bigger base than $e^x$
$\therefore$ $3^x$ grows faster.

14. A function $f(x)$ has a vertical asymptote at $x=2$. The derivative is positive for all $x \neq 2$. Which statement is true?

possible graphs

means slope

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

positive slope

positive slope

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