1. The function g is continuous at all x except $x = 2$. If $\lim_{x \to 2} g(x) = \infty$, which of the following statements about g must be true?

(A) $g(2) = \infty$ X exact point

(B) The line $x = 2$ is a horizontal asymptote to the graph of g. X

(C) The line $x = 2$ is a vertical asymptote to the graph of g. ✓

(D) The line $y = 2$ is a vertical asymptote to the graph of g. X

2. The function g is defined by $g(x) = \left(\frac{x^2-3x-10}{x-5}\right)\ln\left(\frac{x^2+6x+9}{x^3+3x^2}\right)$. At what values of x does the graph of g have a vertical asymptote?

(A) $x = -3$ only

(B) $x = 0$ only

(C) $x = -3$ and $x = 0$ only

(D) $x = -3$, $x = 0$, and $x = 5$

$$\frac{\cancel{(x-5)}(x+2)}{\cancel{(x-5)}} \to \frac{x+2}{1}$$

$$\frac{(x+3)\cancel{(x+3)}}{x^2\cancel{(x+3)}} = \frac{x+3}{x^2}$$

$$\frac{-3+3}{-3^2} = \frac{0}{9} = 0$$

$$\lim_{x\to 0} g(x) = -\lim_{x\to\infty}$$

5. The values $f(x)$ of a function f can be made arbitrarily large by taking x sufficiently close to 1 but not equal to 1. Which of the following statements must be true?

(A) $f(1)$ does not exist.

(B) f is continuous at $x = 1$.

(C) $\lim_{x \to 1} f(x) = \infty$

(D) $\lim_{x \to \infty} f(x) = 1$

1. Let f be the function given by $f(x) = \frac{(\cos x)e^{2x} - 1}{e^{2x-1} + 2}$. What are all horizontal asymptotes to the graph of f ?

(A) $y = -\frac{1}{2}$ only

(B) $y = e$ only

(C) $y = -\frac{1}{2}$ and $y = e$

(D) The graph of f has no horizontal asymptotes.

$$\lim_{x \to -\infty} e^{-2x} = \frac{1}{e^{2x}} = 0$$

$$\frac{0 - 1}{0 + 2} = \frac{-1}{2}$$

$$1 \cdot -\frac{1}{2} = \boxed{-\frac{1}{2}}$$

3. Let f be the function defined by $f(x) = \frac{2-x+3x^2+5x^3-7x^4}{x^4-2x^3-5x^2+2x-3}$ for $x > 0$. Which of the following is a horizontal asymptote to the graph of f?

$$\frac{-7x^4}{x^4} = -7$$

(A) $y = -7$

(B) $y = 2$

(C) $y = 7$

(D) There is no horizontal asymptote to the graph of f.

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4. Let f be the function given by $f(x) = \frac{1+e^{x}\sin x}{e^{x-1}-1}$. What are all horizontal asymptotes of the graph of f ?

$\frac{1}{e^{x+1}} = 0$

$\frac{1+0}{0-1} = \frac{1}{-1}$

$\boxed{-1}$

(A) $y = -1$ only

(B) $y = 1$ only

(C) $y = -1$ and $y = 1$

(D) The graph of f has no horizontal asymptotes.