Quiz 1.11

Name

1. A student attempted to confirm that the function f defined by $f(x) = \frac{x^2-5x+4}{x^2-6x+8}$ is continuous at $x = 4$. In which step, if any, does an error first appear?

- Step 1: $f(x) = \frac{x^2-5x+4}{x^2-6x+8} = \frac{(x-4)(x-1)}{(x-4)(x-2)}$
- Step 2: $\lim_{x\to 4} f(x) = \lim_{x\to 4} \frac{x-1}{x-2} = \frac{3}{2}$
- Step 3: $f(4) = \frac{4-1}{4-2} = \frac{3}{2}$
- Step 4: $\lim_{x\to 4} f(x) = f(4)$, so f is continuous at $x = 4$.

(A) Step 2

(B) Step 3

(C) Step 4

(D) There is no error in the confirmation.

2. $f(x) = \frac{x^3+2x-12}{8\cos\left(\frac{\pi}{2}x\right)+2x^2}$

Let f be the function defined above. Which of the following conditions explains why f is not continuous at $x = 2$?

(A) Neither $\lim_{x\to 2} f(x)$ nor $f(2)$ exists.

(B) $\lim_{x\to 2} f(x)$ exists, but $f(2)$ does not exist.

(C) Both $\lim_{x\to 2} f(x)$ and $f(2)$ exist, but $\lim_{x\to 2} f(x) \neq f(2)$.

(D) Both $\lim_{x\to 2} f(x)$ and $f(2)$ exist, and $\lim_{x\to 2} f(x) = f(2)$.

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3.

$$f(x)=\begin{cases} 2x+3 & \text{for } x<1 \\ 5 & \text{for } x=1 \\ -4x+9 & \text{for } 1<x<3 \\ 4 & \text{for } x=3 \\ x-6 & \text{for } x>3 \end{cases}$$

Let f be the piecewise function defined above. Which of the following statements is false?

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

(B) f is continuous at $x=2$.

(C) f is continuous at $x=3$.

(D) f is continuous at $x=4$.