MAT 136 (Calculus I), Swift. September 13 quiz worth 5 points

No notes, no computers. You may consult neighbors. Name: key

1. Evaluate $\lim_{x\to 1} \frac{\frac{1}{x}-1}{x-1}$. Answer with a sentence, no false equal signs, and good grammar.

$$\lim_{x\to 1} \frac{\frac{1}{x}-1}{x-1} = \lim_{x\to 1} \frac{\left(\frac{1}{x}-1\right)x}{(x-1)x}$$

type $\frac{0}{0}$

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

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

$$= \lim_{x\to 1} \frac{-1}{x}$$

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

Note: Every equal sign is true. The original expression is connected to -1 by a string of equal signs. This is the sentence, with "=" as the verb:

$$\lim_{x\to 1} \frac{\frac{1}{x}-1}{x-1} = \ldots = \ldots = -1$$

Note: $\lim_{x\to 1} \frac{\frac{1}{x}-1}{x-1} \neq \frac{\frac{1}{x}-1}{x-1}$. you can't leave out "$\lim_{x\to 1}$".

2. If $\lim_{x\to 2} f(x) = 0$ and $\lim_{x\to 2} g(x) = 0$, can you conclude that $\lim_{x\to 2} \frac{f(x)}{g(x)}$ DNE? (Yes or No)

Note: Anything can happen.

Examples: $\lim_{x\to 2} \frac{x-2}{(x-2)^2}$ DNE, $\lim_{x\to 2} \frac{(x-2)}{5(x-2)} = \frac{1}{5}$, $\lim_{x\to 2} \frac{(x-2)^2}{(x-2)} = 0$

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No notes, no computers. You may consult neighbors. Name: More Notes.

1. Evaluate $\lim_{x\to 1} \dfrac{\frac{1}{x}-1}{x-1}$. Answer with a sentence, no false equal signs, and good grammar.

$\lim_{x\to 1} \dfrac{\frac{1}{x}-1}{x-1} =$

Assume $\lim_{x\to 2} f(x)=0$ and $\lim_{x\to 2} g(x)=0$.

type $\frac{0}{0}$ We say that $\lim_{x\to 2} \dfrac{f(x)}{g(x)}$ is an indeterminate of type $\frac{0}{0}$

However, we cannot write either of the following:

$\lim_{x\to 2}\left(\dfrac{f(x)}{g(x)}\right) = \dfrac{\lim_{x\to 2} f(x)}{\lim_{x\to 2} g(x)}$ or $\lim_{x\to 2}\left(\dfrac{f(x)}{g(x)}\right) = \dfrac{0}{0}$

2. If $\lim_{x\to 2} f(x) = 0$ and $\lim_{x\to 2} g(x) = 0$, can you conclude that $\lim_{x\to 2} \dfrac{f(x)}{g(x)}$ DNE? (Yes or No)

Writing either of those things on an exam might lose points.

type $\frac{0}{0}$

MAT 136 (Calculus I), Swift. September 13 quiz worth 5 points

No notes, no computers. You may consult neighbors. Name: key, another way.

1. Evaluate $\lim_{x\to 1} \dfrac{\frac{1}{x}-1}{x-1}$. Answer with a sentence, no false equal signs, and good grammar.

$$\lim_{x\to 1} \frac{\frac{1}{x}-1}{x-1} = \lim_{x\to 1} \frac{\frac{1}{x}-\frac{x}{x}}{x-1}$$

$1 = \frac{x}{x}$, provided $x \neq 0$.

$$= \lim_{x\to 1} \frac{\frac{1-x}{x}}{x-1}$$

subtract fractions

$$= \lim_{x\to 1} \left(\frac{1-x}{x} \cdot \frac{1}{x-1}\right)$$

invert and multiply

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

$\frac{a}{b}\cdot\frac{c}{d} = \frac{a\cdot c}{b\cdot d}$

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

2. If $\lim_{x\to 2} f(x) = 0$ and $\lim_{x\to 2} g(x) = 0$, can you conclude that $\lim_{x\to 2} \dfrac{f(x)}{g(x)}$ DNE? (Yes or (No))

type $\frac{0}{0}$