

Math 131 - Quiz 3

This quiz is available in Canvas.

1. (2 points) Evaluate the limit: $\lim_{x \rightarrow 0} \frac{3 \sin 2x}{5x}$

- (a) 0/0
- (b) 6/5
- (c) 3/5
- (d) 2/5

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{3}{5} \frac{\sin 2x}{x} &= \lim_{x \rightarrow 0} \frac{3}{5} \frac{2 \sin 2x}{2x} \\ &= \frac{6}{5} \lim_{x \rightarrow 0} \frac{\sin 2x}{2x} = \frac{6}{5} \end{aligned}$$

2. (1 point) Suppose that $\lim_{x \rightarrow 5} \frac{f(x)}{x-5} = 8$. Which one of the following must be true?

- (a) $\lim_{x \rightarrow 5} f(x) = 0$
- (b) $\lim_{x \rightarrow 5} f(x) = 8$
- (c) $\lim_{x \rightarrow 5} f(x) = 40$
- (d) $\lim_{x \rightarrow 5} f(x)$ DNE

↑ SINCE PLUGGING IN MAKES A ZERO DENOMINATOR, THE ONLY WAY THE LIMIT COULD BE 8 IS IF THE LEFT-HAND SIDE IS A $\frac{0}{0}$ FORM.

3. (2 points) Evaluate the limit: $\lim_{x \rightarrow 3} \frac{\frac{x-1}{x-2} - \frac{x+5}{x+1}}{x-3}$

- (a) -1/2
- (b) 0
- (c) 0/0
- (d) -3/4

$$\begin{aligned} \lim_{x \rightarrow 3} \frac{\frac{(x-1)(x+1) - (x+5)(x-2)}{(x+1)(x-2)}}{x-3} &= \lim_{x \rightarrow 3} \frac{x^2 - 1 - x^2 - 3x + 10}{(x+1)(x-2)(x-3)} = \lim_{x \rightarrow 3} \frac{-3x + 9}{(x+1)(x-2)(x-3)} \\ &= \lim_{x \rightarrow 3} \frac{-3(x-3)}{(x+1)(x-2)(x-3)} = \frac{-3}{4} \end{aligned}$$

4. (1 point) Evaluate the limit:

$$\lim_{x \rightarrow 2^-} \left(\frac{x^2 - 3}{x + 2} \right) = \frac{4 - 3}{2 + 2} = \frac{1}{4}$$

- (a) 1/4
- (b) 1/0
- (c) 0
- (d) ∞

5. (2 points) Determine the limit $\lim_{w \rightarrow -3^+} f(w)$, where $f(w) = \begin{cases} 3w^2 - w, & w \leq -3 \\ 5w + 2, & w > -3 \end{cases}$ ←

- (a) 30
- (b) -13
- (c) 17
- (d) The limit does not exist.

$$\lim_{w \rightarrow -3} (5w + 2) = -13$$

6. (1 point) Evaluate the limit:

$$\lim_{x \rightarrow 7^-} \frac{x}{x - 7} \quad \begin{matrix} 7/0 \\ \text{SOME KIND OF INF.} \end{matrix}$$

- (a) -1/2
- (b) 0
- (c) $+\infty$
- (d) $-\infty$

FOR X A BIT SMALLER THAN 7,

$$\frac{x}{x-7} \text{ IS } \frac{+}{-} = -$$

7. (1 point) The graph of $f(x) = \frac{5x(x-2)(x+1)}{(x-2)(3x+2)(x-7)}$ has some vertical asymptotes.

Which of the following is a vertical asymptote of the graph?

- (a) $x = 0$
- (b) $x = 2$
- (c) $x = -7$
- (d) $x = -2/3$

$$\begin{matrix} \text{V.A.'s ARE} & x = -\frac{2}{3} & (3x+2=0) \\ & x = 7 & (x-7=0) \end{matrix}$$