Basic Calculus | 3rd Quarter

PeTa: Trigonometric Functions and Limits

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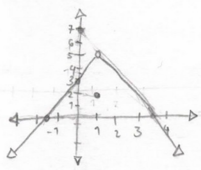
PeTa

① Let $g(x)$ be defined by:

$$g(x) = \begin{cases} 2x+3, & x<1 \\ 2, & x=1 \\ 7-2x, & 1<x \end{cases}$$

ⓐ Sketch the graph of $g(x)$



$g(x)$

ⓑ Find each of the ff. limits: If the limit exists, state the reason.

- $\lim_{x\to1^+} g(x)$
- $\lim_{x\to1^-} g(x)$
- $\lim_{x\to1} g(x)$

$\boxed{\lim_{x\to1^+} g(x) = 5}$ $\boxed{\lim_{x\to1^-} g(x) = 5}$ $\boxed{\lim_{x\to1} g(x) = 5}$

= Limit exists because $\lim_{x\to1^+} g(x)$ and $\lim_{x\to1^-} g(x)$ are both of equal values to each other.

② Determine the infinite limit of $\lim_{x\to2^+} \frac{x^2-2x-8}{x^2-5x+6}$. Show your solution analytically and graphically.

② Solution:

ANALYTICAL

$$(x^2-2x-8)\left(\frac{1}{x^2-5x+6}\right)$$

$$\lim_{x\to2+}(x^2-2x-8)\cdot\lim_{x\to2+}\left(\frac{1}{x^2-5x+6}\right) = (-8)(-\infty) \boxed{= \infty}$$

$$\lim_{x\to2+}(x^2-2x-8) = -8$$

$$\lim_{x\to2+}\left(\frac{1}{x^2-5x+6}\right) = -\infty$$

GRAPHICAL

$$x\text{-int} = 0 = \frac{x^2-2x-8}{x^2-5x+6} \qquad y\text{-int} = \frac{(0)^2-2(0)-8}{(0)^2-5(0)+6}$$

$$x\text{-int} = x^2-2x-8 \qquad = \frac{-8}{6}$$

$$x\text{-int} = (x-4)(x+2) \qquad \boxed{y\text{-int} = -1\tfrac{1}{3}}$$

$$\boxed{x\text{-int} = 4, -2}$$

$$\boxed{\begin{array}{l} HA = 1 \\ VA = 2, 3 \end{array}} \qquad \frac{(2.1-4)(2.1+2)}{(2.1-2)(2.1-3)} = \frac{-7.79}{-0.09} \boxed{= 86.56}$$