MAT A29 TUT0018, Tutorial 2 (Week 3)
Tuesdays 7 - 9pm (We will start at 7:10pm)

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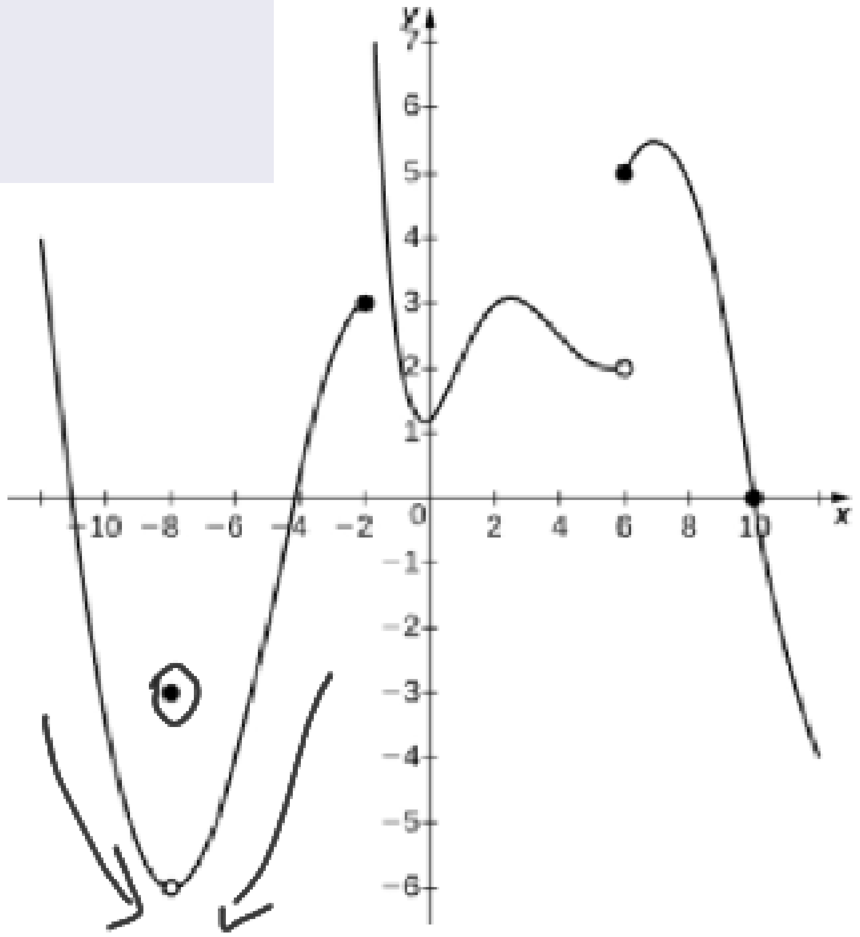
Question

Compute the value of $\lim_{x\to 0} \frac{\sin(2x)}{x}$ *by making a table of values for* $x = \pm 0.1, \pm 0.01, \pm 0.001, \pm 0.0001$.

x	$\frac{\sin(2x)}{x}$
0.1	1.99
-0.01	1.9999...
0	~2
-0.01	1.9999...
-0.1	1.99

Question

Consider the graph below. Is it true that $\lim_{x \to -8} f(x) = f(-8)$?



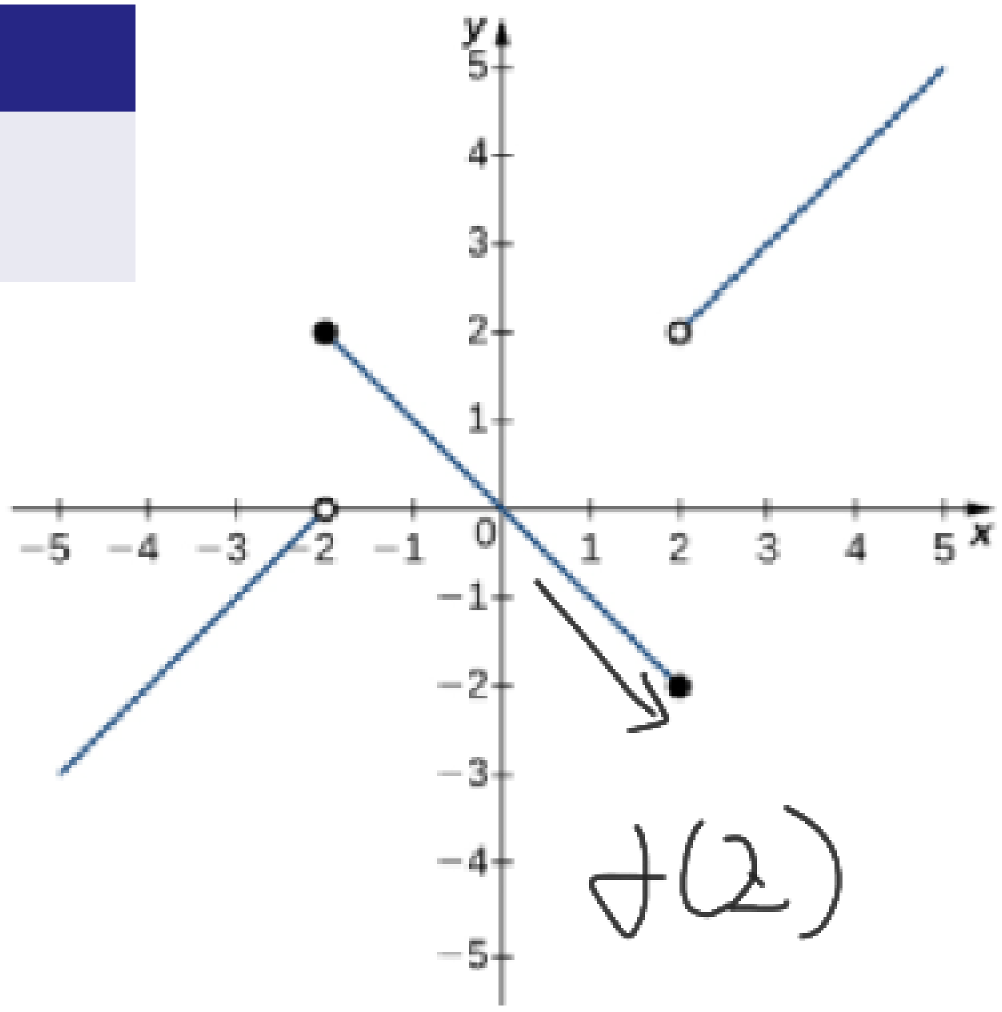
$$\lim_{x \to -8^-} f(x) = \lim_{x \to -8^+} f(x)$$

$$= -6$$

$$\neq f(-8) = -3$$

Question

Consider the graph below. Calculate $\lim_{x \to 2^-} f(x)$.



using the left side value, $\lim_{x \to 2^-} f(x) = -2$

Question

Calculate the value of $\lim_{x\to 4} \frac{x^2-16}{x-4} = f(x)$

$$f(4) = \frac{0}{0}$$

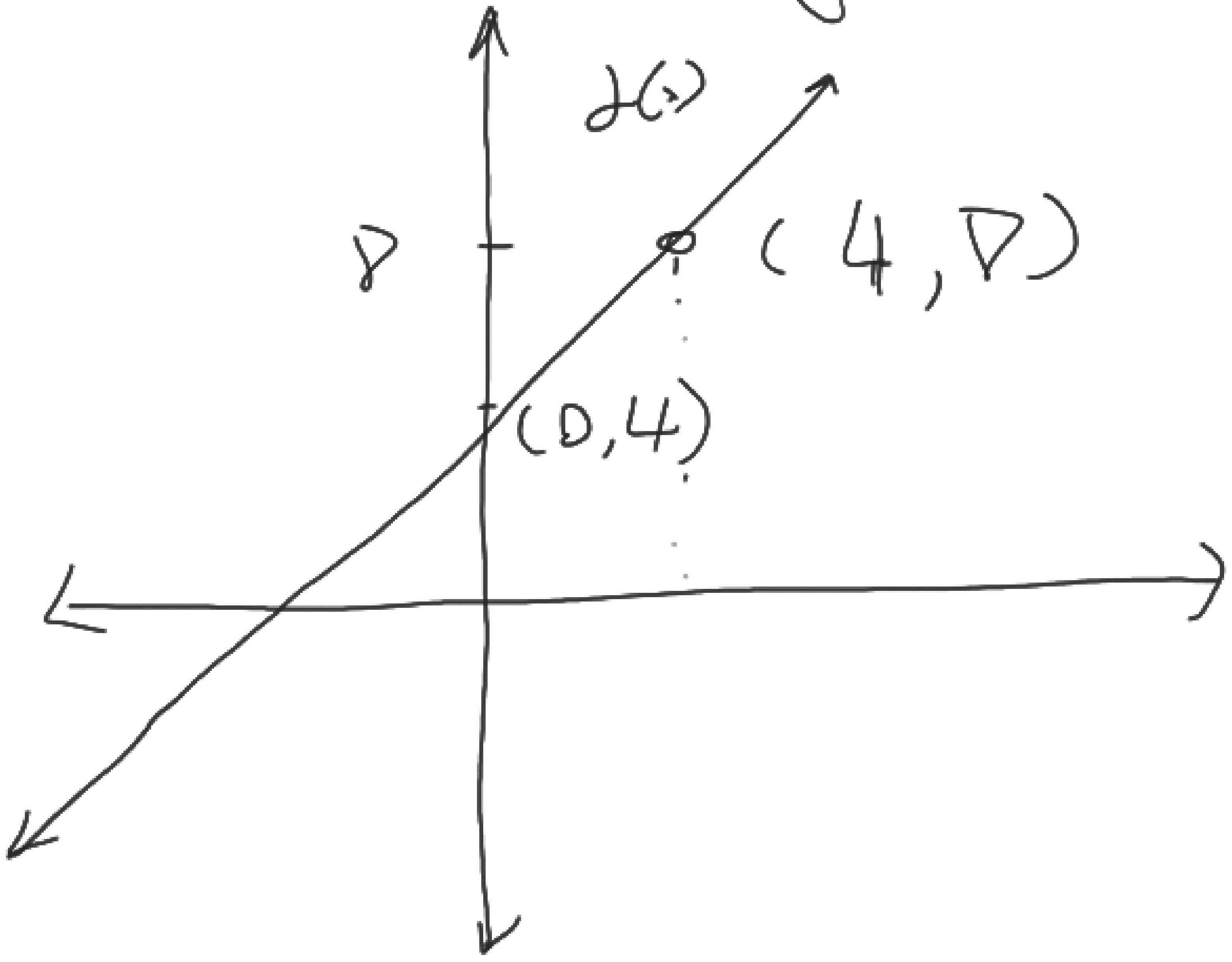
x	$f(x)$
3.9	7.9
3.99	7.99
4.01	8.01
4.1	8.1

This suggests $\lim_{x\to 4} f(x) = 8$

Question

Calculate the value of $\lim_{x\to 4} \frac{x^2-16}{x-4} = f(x)$

Graph



$$f(x) = \frac{(x-4)(x+4)}{(x-4)} = (x+4)$$

$$\lim_{x\to 4} f(x) = 8$$

Question

Calculate the value of $\lim_{x \to 4} \frac{x^2-16}{x-4}$ $= f(x) = (x+4)$

$D = \{x \in \mathbb{R} \mid x \neq 4\}$

$$\lim_{x \to 4} \frac{x^2-16}{x-4} = \lim_{x \to 4} (x+4)$$

$$= 8$$

Question

Assume that $\lim_{x \to 6} f(x) = 4$ *and* $\lim_{x \to 6} g(x) = 9$. *Calculate:*

$$L = \lim_{x \to 6} \sqrt{g(x) - f(x)}$$

$$\lim_{x \to 6} \sqrt{f(x)} = \sqrt{\lim_{x \to 6} f(x)}$$

$$L = \sqrt{\lim_{x \to 6} g(x) - \lim_{x \to 6} f(x)} = \sqrt{9 - 4} = \sqrt{5}$$

$$f(x) = \frac{x}{(x^2-16)}$$

find range algebraically

$$x = \frac{f^{-1}(x)}{f^{-1}(x)^2-16}$$

$$(f^{-1}(x)^2-16)x = f^{-1}(x)$$

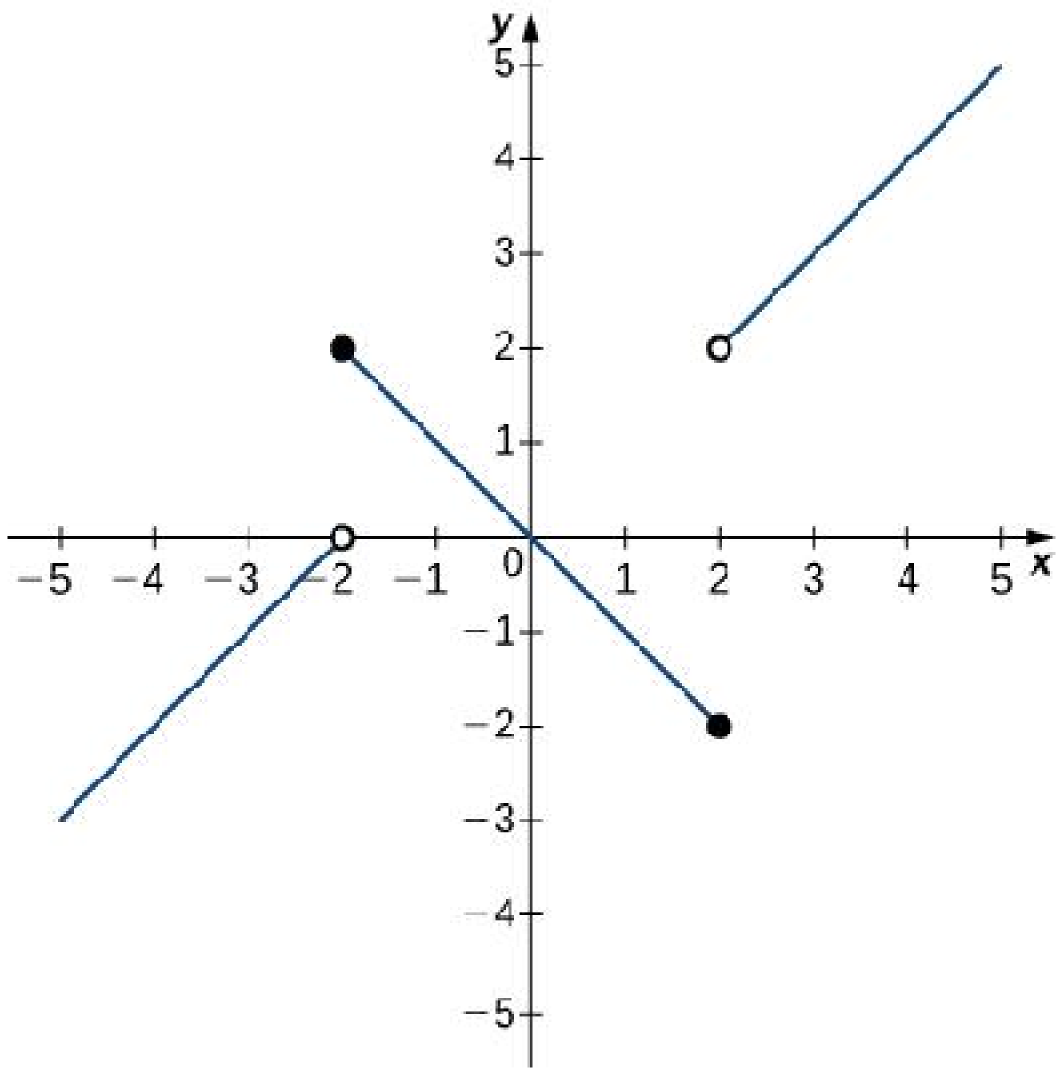
$$f^{-1}(x)^2-16 = f^{-1}(x) / x$$

$$f^{-1}(x)^2 = f^{-1}(x)/_{x} - 16$$

$$f^{-1}(x)^2 = \frac{f^{-1}(x) - 16x}{x}$$

too hard!

try graph



exists!

$$\lim_{x \to c} f(x)$$

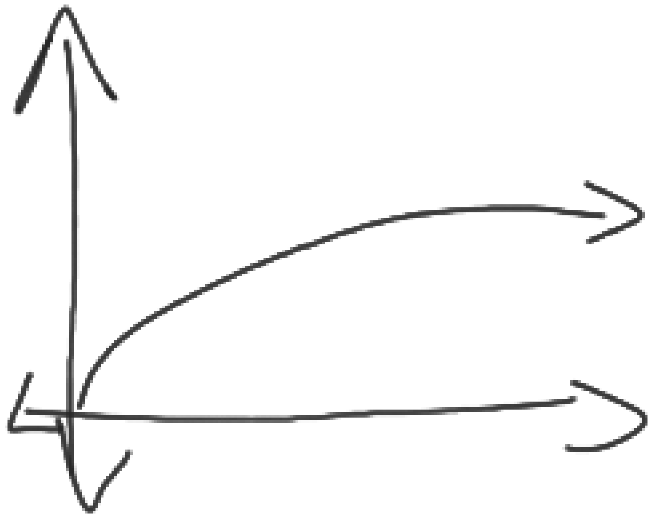
$$= \lim_{x \to c^-} f(x) = \lim_{x \to c^+} f(x)$$

$$-2 \neq 2$$

domain

$\sqrt{8x - 1} = f(x)$

$\sqrt{x}$ D: $\{x \in \mathbb{R} \mid x \geq 0\}$



D of $f(x)$

$$\left\{ x \in \mathbb{R} \;\middle|\; \begin{array}{l} 8x - 1 \geq 0 \\ \Rightarrow 8x \geq 1 \\ \quad x \geq 1/8 \end{array} \right\}$$

range $\sqrt{8x-1} = f(x)$

range $\sqrt{x} = \{y \in \mathbb{R} \mid y \geq 0\}$

$\sqrt{8f^{-1}(x)-1} = x$

$8f^{-1}(x) - 1 = x^2$

$8f^{-1}(x) = x^2 - 1$

$f^{-1}(x) = \frac{x^2-1}{8}$

$\Rightarrow$ range$(\sqrt{8x-1}) =$

$D = \mathbb{R}$