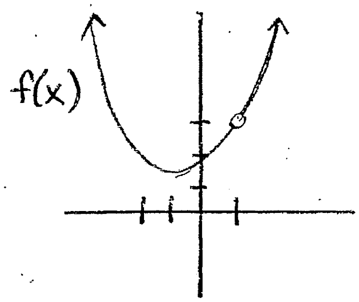
Ch.1.2 Notes on Limits

Limit: y-value that a function or graph approaches as the x-value gets closer to a given constant



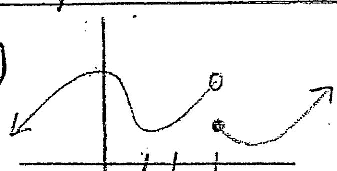
"The limit of f(x) as x approaches 1 is 3."

Notation: $\lim_{x \to 1} f(x) = 3$

* In order for a limit to exist, the graph must approach the same y-value from both directions.

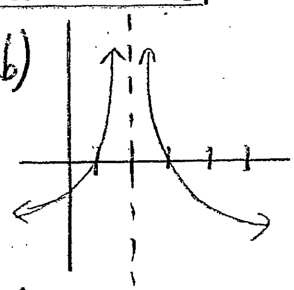
Examples where limit does not exist:

a)



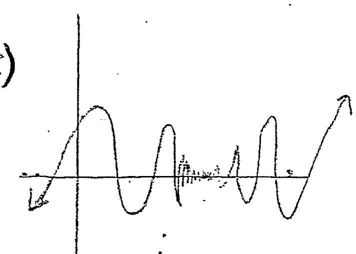
$\lim_{x \to 3} f(x) =$ ____
(____)

b)



$\lim_{x \to 2} f(x) =$ ____
(or ____)

c)



Graphs with oscillating behavior

ex: $f(x) = \sin\left(\frac{1}{x}\right)$

$\lim_{x \to 3} f(x) =$ ____

Ex.1 Finding limit using calculator and table of values.

Find $\lim_{x \to 1} \frac{x^3 - 1}{x - 1}$

Steps:

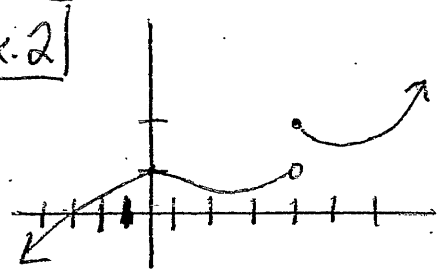
1) Enter f(x) in "Y_1 ="
2) 2^{nd} window (Tblset)
   ↳ Independent: $\boxed{\text{Ask}}$
3) 2nd Graph (Table)
4) Enter values of x approaching 1 from both sides: .9, .99, .999, 1.0001, 1.001, 1.01, 1.1

X	0.9	0.99	0.999	1	1.0001	1.001	1.01	1.1
Y	2.71	2.97	2.997	und	3.0003	3.003	3.030	3.31

→ ←

$\lim_{x \to 1} \frac{x^3 - 1}{x - 1} =$ ____ since y-value approaches ____ from both sides the graph.

Ex. 2

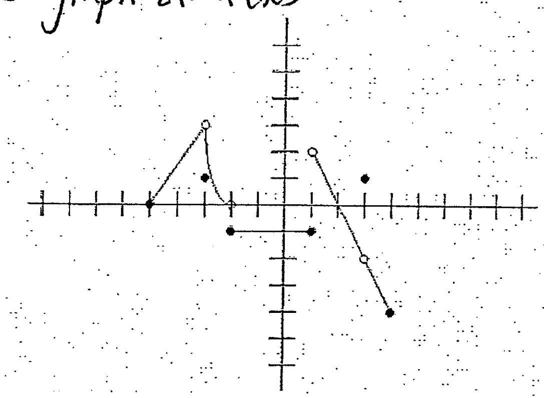


a) $\lim_{x \to 0} f(x) =$

b) $\lim_{x \to -3} f(x) =$

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

3) graph of $f(x)$



a) $f(-2) =$

b) $\lim_{x \to -2} f(x) =$

c) $\lim_{x \to -3} f(x) =$

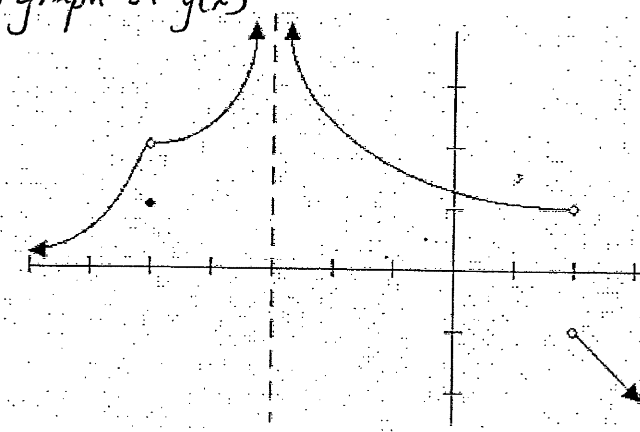
d) $\lim_{x \to 2} f(x) =$

e) $\lim_{x \to 3} f(x) =$

f) $f(3) =$

g) $\lim_{x \to -1.34} f(x) =$

4) graph of $g(x)$



a) $\lim_{x \to -5} g(x) =$

b) $\lim_{x \to -3} g(x) =$

c) $g(-5) =$

d) $\lim_{x \to 0} g(x) =$

e) $\lim_{x \to 2} g(x) =$

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g) $\lim_{x \to 3} g(x) =$

KEY 8/13/14

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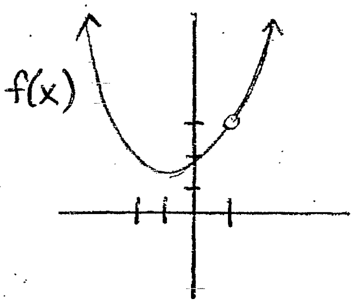

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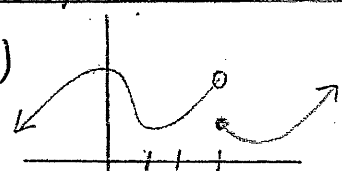
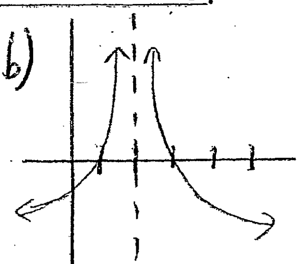


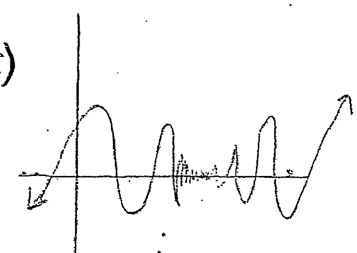
$\lim_{x \to 3} f(x) = \underline{DNE}$ (does not exist)

b)



$\lim_{x \to 2} f(x) = \underline{+\infty}$ (or DNE)

c)



Graphs with oscillating behavio

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$\lim_{x \to 3} f(x) = \underline{DNE}$

$\boxed{\text{Ex. 1}}$ Finding limit using calculator and table of values.

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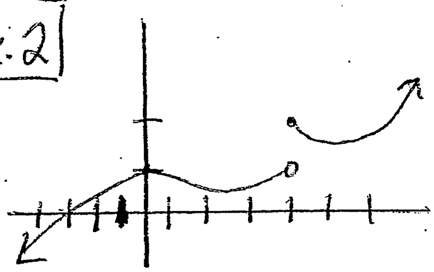
$\lim_{x \to 1} \frac{x^3 - 1}{x - 1} = \underline{3}$ since y-value approaches $\underline{3}$ from both sides the graph.

Ex. 2

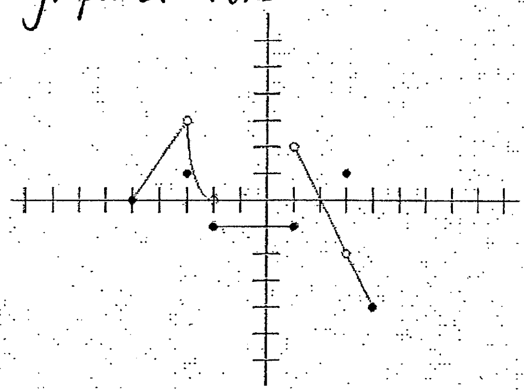


a) $\lim_{x\to 0} f(x) = 1$

b) $\lim_{x\to -3} f(x) = 0$

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

3) graph of $f(x)$



a) $f(-2) = -1$

b) $\lim_{x\to -2} f(x) =$ DNE

c) $\lim_{x\to -3} f(x) = 3$

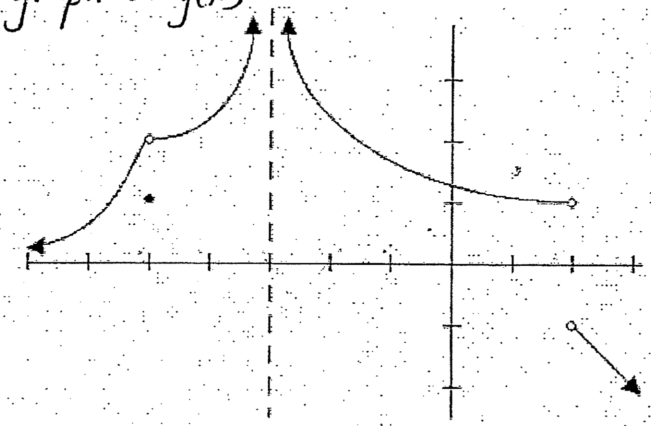
d) $\lim_{x\to 2} f(x) = 0$

e) $\lim_{x\to 3} f(x) = -2$

f) $f(3) = 1$

g) $\lim_{x\to -1.34} f(x) = -1$

4) graph of $g(x)$



a) $\lim_{x\to -5} g(x) = 2$

b) $\lim_{x\to -3} g(x) = +\infty$

c) $g(-5) = 1$

d) $\lim_{x\to 0} g(x) = 1.2$

e) $\lim_{x\to 2} g(x) =$ DNE

f) $g(2) =$ DNE

g) $\lim_{x\to 3} g(x) = -2$