

EXERCÍCIOS – CÁLCULO I – LISTA 2

Calcule, se existir:

$$1) \lim_{x \rightarrow 0} \frac{1}{x}$$

$$2) \lim_{x \rightarrow 2} \frac{1}{x-2}$$

$$3) \lim_{x \rightarrow 4} \frac{1}{|x-4|}$$

$$4) \lim_{x \rightarrow 0} \frac{-1}{x^2}$$

$$5) \lim_{x \rightarrow 2^+} \frac{x+2}{2-x}$$

$$6) \lim_{x \rightarrow 0^-} \frac{3-x}{x^2}$$

$$7) \lim_{x \rightarrow 2^+} (x^2 + 3)$$

$$8) \lim_{x \rightarrow 4^-} \frac{x+1}{x+5}$$

$$9) \lim_{x \rightarrow 0^-} \frac{1}{|x|}$$

$$10) \lim_{x \rightarrow 0^+} (\ln x)$$

$$11) \lim_{x \rightarrow +\infty} \frac{1}{x}$$

$$12) \lim_{x \rightarrow -\infty} \frac{1}{x}$$

$$13) \lim_{x \rightarrow +\infty} \frac{4}{x}$$

$$14) \lim_{x \rightarrow +\infty} \left(\frac{1}{x} + 3 \right)$$

$$15) \lim_{x \rightarrow +\infty} 2^x$$

$$16) \lim_{x \rightarrow -\infty} 2^x$$

$$17) \lim_{x \rightarrow +\infty} \left(\frac{1}{3} \right)^x$$

$$18) \lim_{x \rightarrow -\infty} \left(\frac{1}{3} \right)^x$$

$$19) \lim_{x \rightarrow -\infty} (2^x + 5)$$

$$20) \lim_{x \rightarrow +\infty} x^2$$

$$21) \lim_{x \rightarrow -\infty} x^2$$

$$22) \lim_{x \rightarrow -\infty} x^3$$

$$23) \lim_{x \rightarrow +\infty} x^3$$

LISTA 2

1) não existe

2) não existe

3) $+\infty$

4) $-\infty$

5) $-\infty$

6) $+\infty$

7) 7

8) $\frac{5}{9}$

9) $+\infty$

10) $-\infty$

11) 0

12) 0

13) 0

14) 3

15) $+\infty$

16) 0

17) 0

18) $+\infty$

19) 5

20) $+\infty$

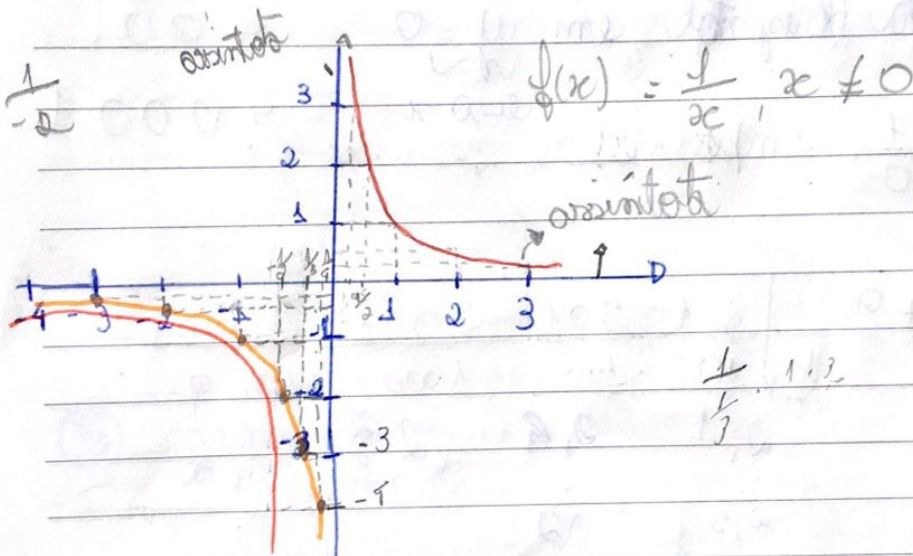
21) $+\infty$

22) $-\infty$

23) $+\infty$

Exercice II

① $\lim_{x \rightarrow 0} \frac{1}{x} = \frac{1}{0}$ impossible



$\lim_{x \rightarrow 0^+} \frac{1}{x} = +\infty$

$\frac{1}{x}$	0,1	0,01	0,001	0,0001
$\frac{1}{x}$	10	100	1000	10000

$+\infty$
La courbe s'élève indéfiniment

$\lim_{x \rightarrow 0^-} \frac{1}{x} = -\infty$

$\frac{1}{x}$	-0,1	-0,01	-0,001	-0,0001
$\frac{1}{x}$	-10	-100	-1000	-10000

La courbe s'abaisse indéfiniment

Donc $\lim_{x \rightarrow 0} \frac{1}{x}$ n'existe pas car $\lim_{x \rightarrow 0^+} f(x) \neq \lim_{x \rightarrow 0^-} f(x)$

② $\lim_{x \rightarrow 2} \frac{1}{x-2} = \frac{1}{0}$ undefined $\lim_{x \rightarrow 2} x = 2$

$\lim_{x \rightarrow 2^+} \frac{1}{x-2} = +\infty$

$\frac{1}{x-2}$	2,1	2,01	2,001	2,0001
$\frac{1}{x-2}$	10	100	1000	10000

$\frac{1}{x-2}$ 2,1 2,01 2,001

$\rightarrow +\infty$

$\lim_{x \rightarrow 2^-} \frac{1}{x-2} = -\infty$

2,5 1,2

$\frac{1}{x-2}$	1,9	1,99	1,999	1,9999
$\frac{1}{x-2}$	-10	-100	-1000	-10000

Repeat: $\lim_{x \rightarrow 2} \frac{1}{x-2}$ does not exist $\lim_{x \rightarrow 2^+} f(x) = +\infty$ $\lim_{x \rightarrow 2^-} f(x) = -\infty$

③ $\lim_{x \rightarrow 4} \frac{1}{|x-4|} = \frac{1}{0}$ undefined $\lim_{x \rightarrow 4} x = 4$

$\lim_{x \rightarrow 4^+} \frac{1}{|x-4|} = +\infty$

$\frac{1}{ x-4 }$	4,1	4,01	4,001
$\frac{1}{ x-4 }$	10	100	1000

$\rightarrow +\infty$

$\lim_{x \rightarrow 4^-} \frac{1}{|x-4|} = +\infty$

$\frac{1}{ x-4 }$	3,9	3,99	3,999
$\frac{1}{ x-4 }$	10	100	1000

Repeat: $\lim_{x \rightarrow 4} \frac{1}{|x-4|} = +\infty$ $\lim_{x \rightarrow 4^+} f(x) = +\infty$ $\lim_{x \rightarrow 4^-} f(x) = +\infty$

④ $\lim_{x \rightarrow 0} \frac{-1}{x^2} = \frac{-1}{0} = \frac{-1}{0}$ improprio



$\lim_{x \rightarrow 0^+} \frac{-1}{x^2} = -\infty$

$\frac{-1}{x^2}$

0,1 0,01 0,001

-100 -1000 -10000

$-\infty$

$\lim_{x \rightarrow 0^-} \frac{-1}{x^2} = -\infty$

$\frac{-1}{x^2}$

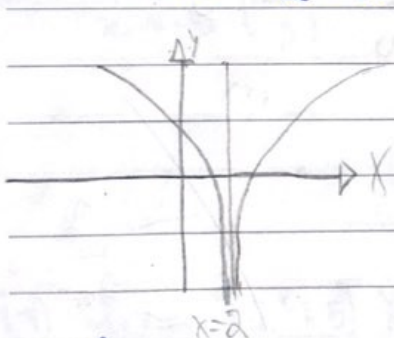
-0,1 -0,01 -0,001

-100 -1000 -10000

$-\infty$

R. $\lim_{x \rightarrow 0} \frac{-1}{x^2} = -\infty$

⑤ $\lim_{x \rightarrow 2} \frac{x+2}{2-x} = \frac{4}{0}$



$\frac{x+2}{2-x}$

2,1 2,01 2,001

4,1 -4,01 -4,001

$-\infty$

$\lim_{x \rightarrow 1}$

$\lim_{x \rightarrow 1^+}$

$x \rightarrow 1^-$

⑥ $\lim_{x \rightarrow 0} \frac{3-x}{x^2} = \frac{3-0}{0} = \frac{3}{0}$ improprio

$\lim_{x \rightarrow 0^+} \frac{3-x}{x^2} = +\infty$

$\frac{3-x}{x^2}$

0,1 0,01 0,001

290 2900 29000

$+\infty$

$\lim_{x \rightarrow 0^-} \frac{3-x}{x^2} = +\infty$

$\frac{3-x}{x^2}$

-0,1 -0,01 -0,001

+290 +2900 +29000

$+\infty$

Resposta: $\lim_{x \rightarrow 0} \frac{3-x}{x^2} = +\infty$

$\frac{1}{\sqrt{x}}$

$\frac{1}{\sqrt{x-3}}$

$\frac{1}{\sqrt{x-3}}$

$$\textcircled{7} \lim_{x \rightarrow 2^+} (x^2 + 3) = 2^2 + 3 = 7 //$$

0,0064

$$\textcircled{8} \lim_{x \rightarrow 4} \frac{x+1}{x+5} = \frac{4+1}{4+5} = \frac{5}{9} //$$

$$\textcircled{9} \lim_{x \rightarrow 0^-} \frac{1}{|x|} = \frac{1}{|0|} = \frac{1}{0} = \text{unpasseable}$$

$$\lim_{x \rightarrow 0^+} \frac{1}{|x|} = +\infty$$

$ x $	0,1	0,01	0,001
$\frac{1}{ x }$	10	100	1000

$$\lim_{x \rightarrow 0^-} \frac{1}{|x|} = +\infty$$

$ x $	0,1	0,01	0,001
$\frac{1}{ x }$	10	100	1000

Repeats: $\lim_{x \rightarrow 0} \frac{1}{|x|} = +\infty //$

$$\textcircled{10} \lim_{x \rightarrow 0^+} \frac{(\ln x)^0}{\ln x} = -\infty$$

$\ln x$	0,1	0,01	0,001
$\ln x$	-2,30	-4,60	-6,90

$$\textcircled{13} \lim_{x \rightarrow +\infty} \frac{4}{x} = 0$$

x	10	100	1000
$\frac{4}{x}$	0,4	0,004	0,0004

$$\textcircled{14} \lim_{x \rightarrow +\infty} \left(\frac{1}{x} + 3 \right) = \lim_{x \rightarrow +\infty} \frac{1}{x} + \lim_{x \rightarrow +\infty} 3 = 0 + 3 = 3 //$$

$$(15) \lim_{x \rightarrow +\infty} 2^x = +\infty$$

	10	100	1000
2^x	1020	1268	10 ³⁰
			$+\infty$

$$(16) \lim_{x \rightarrow -\infty} 2^x = 0$$

	-10	-100	-1000
2^x	0.0019	0.0000018	
			0

$$(17) \lim_{x \rightarrow +\infty} \left(\frac{1}{3}\right)^x = 0$$

	10	100	1000
$\left(\frac{1}{3}\right)^x$	5.64x10 ⁻⁵	5.64x10 ⁻⁴⁸	
			0

$$(18) \lim_{x \rightarrow -\infty} \left(\frac{1}{3}\right)^x = +\infty$$

	-10	-100	-1000
$\left(\frac{1}{3}\right)^x$	59.049	5.1x10 ¹²	
			$+\infty$

$$(19) \lim_{x \rightarrow -\infty} (2^x + 5) = \lim_{x \rightarrow -\infty} 2^x + \lim_{x \rightarrow -\infty} 5 = 0 + 5 = 5$$

$$(20) \lim_{x \rightarrow +\infty} x^2 = +\infty$$

	10	100	1000
x^2	100	10000	1000000
			$+\infty$

$$(21) \lim_{x \rightarrow -\infty} x^2 = +\infty$$

	-10	-100	-1000
x^2	100	10000	1000000
			$+\infty$

$$\lim_{x \rightarrow -\infty} x^3 = -\infty$$

x^3	-50	-100	-1000
	-1000	-1000000	-1000000000

$$\lim_{x \rightarrow +\infty} x^3 = +\infty$$

x^3	50	100	1000
	1000	1000000	1000000000