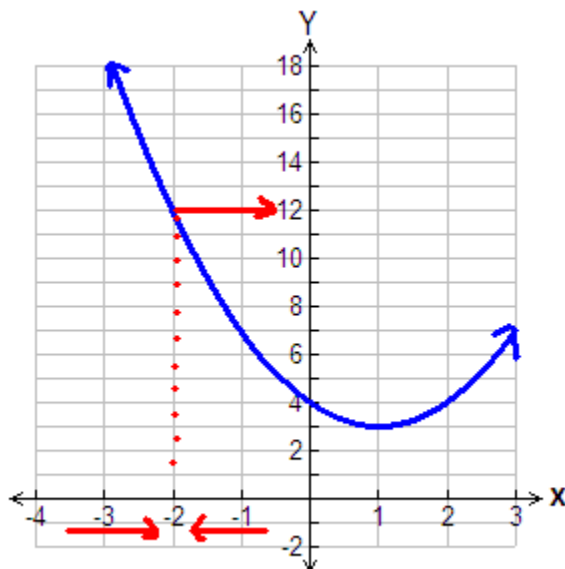
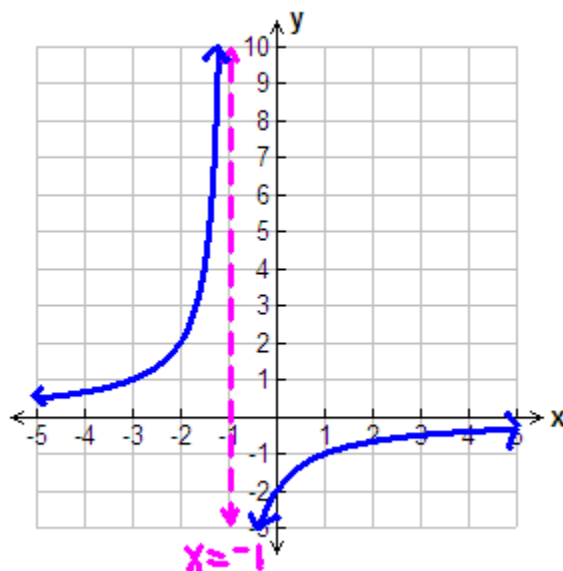


1. $\lim_{x \rightarrow -2} (x^2 - 2x + 4) = 12$



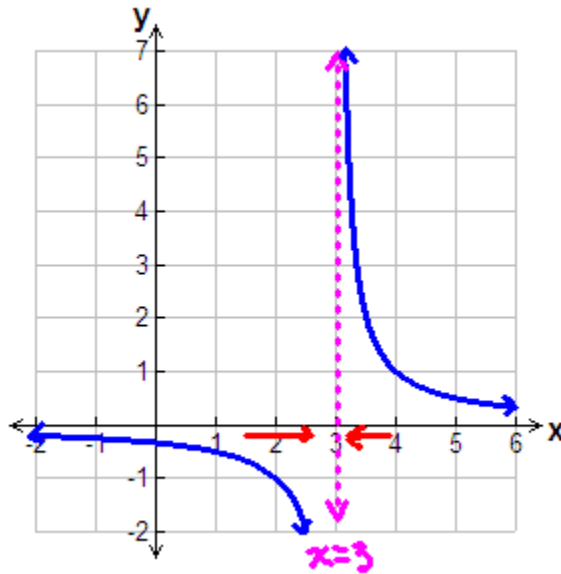
x	y1(x) $x^2 - 2x + 4$
-2.08	12.4864
-2.07	12.4249
-2.06	12.3636
-2.05	12.3025
-2.04	12.2416
-2.03	12.1809
-2.02	12.1204
-2.01	12.0601
-2	12
-1.99	11.9401
-1.98	11.8804
-1.97	11.8209
-1.96	11.7616

2. $\lim_{x \rightarrow -1} \frac{-2}{x+1}$ does not exist



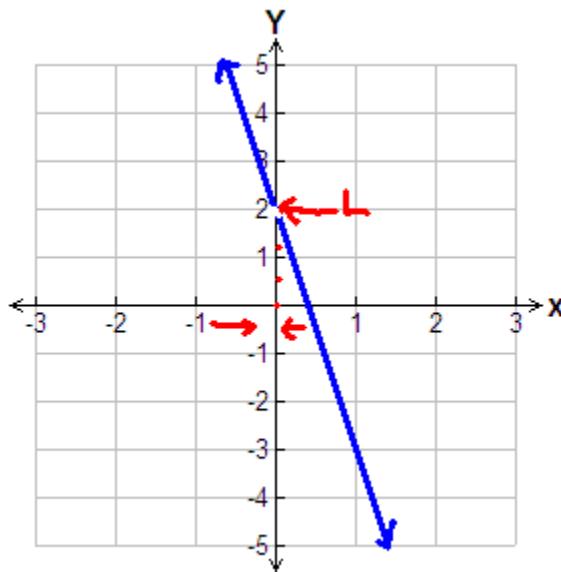
x	y1(x) $\frac{-2}{x+1}$
-1.8	2.5
-1.7	2.85714
-1.6	3.33333
-1.5	4
-1.4	5
-1.3	6.66667
-1.2	10
-1.1	20
-1	undef
-0.9	-20
-0.8	-10
-0.7	-6.66667
-0.6	-5
-0.5	-4
-0.4	-3.33333
-0.3	-2.8571
-0.2	-2.5
-0.1	-2.2222

3. $\lim_{x \rightarrow 3} \frac{x-3}{x^2-6x+9}$ does not exist



x	y1(x) (x-3)/(x^2-6x+9)
2.92	-12.5
2.93	-14.286
2.94	-16.667
2.95	-20
2.96	-25
2.97	-33.333
2.98	-50
2.99	-100
3	undef
3.01	100
3.02	50
3.03	33.3333
3.04	25

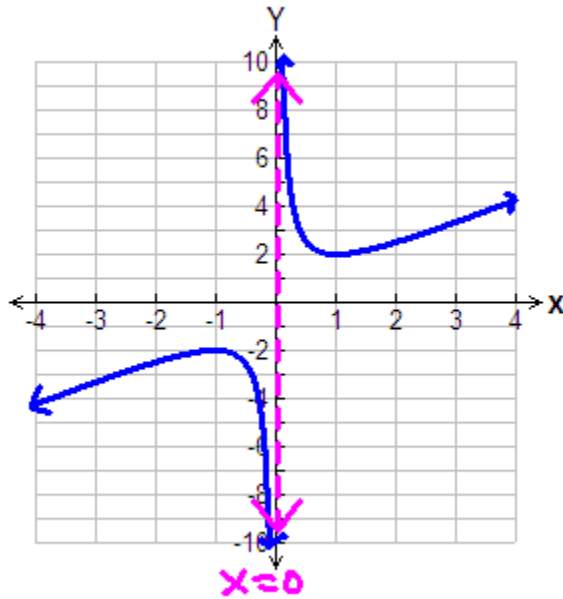
4. $\lim_{x \rightarrow 0} \frac{2x-5x^2}{x} = 2$



x	y1(x) (2x-5x^2)/x
-0.007	2.035
-0.006	2.03
-0.005	2.025
-0.004	2.02
-0.003	2.015
-0.002	2.01
-0.001	2.005
0	undef
0.001	1.995
2.00E-03	1.99
0.003	1.985
0.004	1.98
0.005	1.975

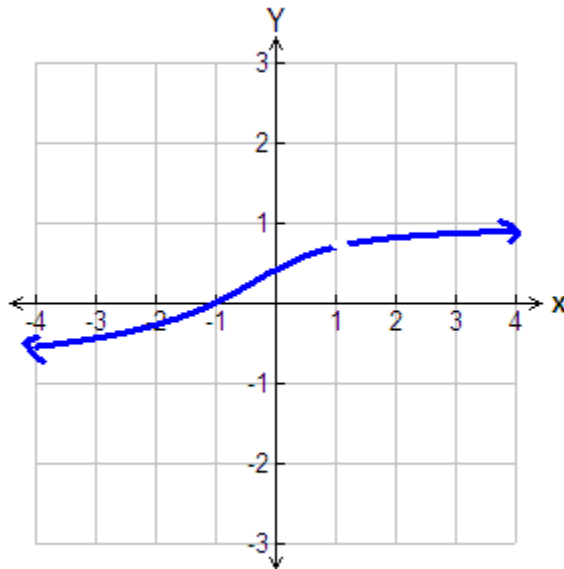
While calculator gives “undefined”, here it indicated a hole in the graph NOT a vertical asymptote. Original function can be reduced to produce a function that agrees with another except at $x=0$. The functions have different domains!

5. $\lim_{x \rightarrow 0} \left(x + \frac{1}{x} \right)$ does not exist



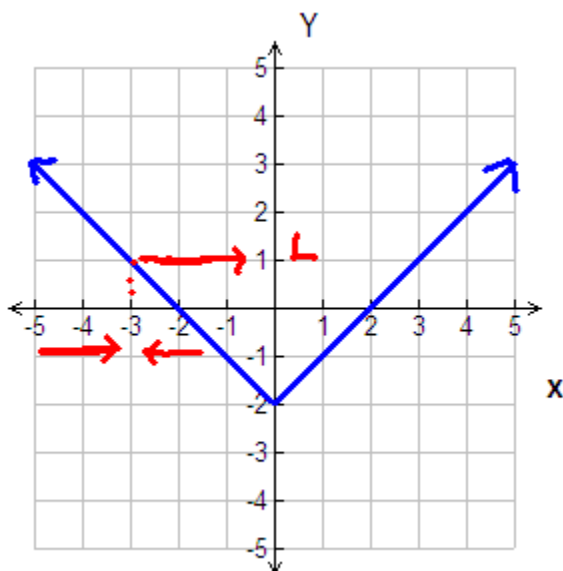
x	y1(x) x+1/x
-0.05	-20.05
-0.04	-25.04
-0.03	-33.363
-0.02	-50.02
-0.01	-100.01
0	undef
0.01	100.01
0.02	50.02
0.03	33.3633
0.04	25.04
0.05	20.05
0.06	16.7267
0.07	14.3557

6. $\lim_{x \rightarrow 1} \frac{\sqrt{x^2+1} - \sqrt{2}}{x-1} = \frac{\sqrt{2}}{2} \approx 0.70711$



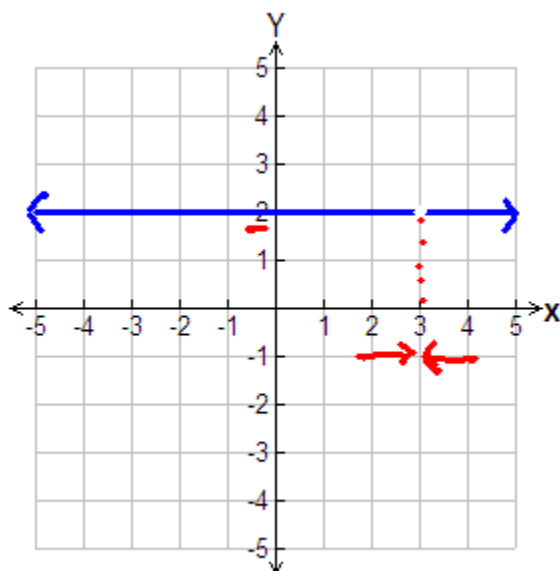
x	y1(x) (sqrt(x^2+1) - sqrt(2)) / (x-1)
0.99995	0.7071
0.99996	0.7071
0.99997	0.7071
0.99998	0.7071
0.99999	0.7071
1	undef
1.00001	0.70711
1.00002	0.70711
1.00003	0.70711
1.00004	0.70711
1.00005	0.70712
1.00006	0.70712
1.00007	0.70712

$$7. \lim_{x \rightarrow -3} (|x| - 2) = 1$$



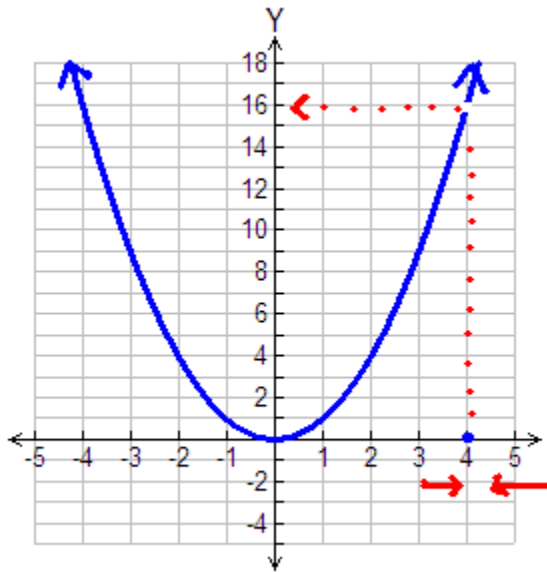
x	y1(x) abs(x)
-3.009	1.009
-3.008	1.008
-3.007	1.007
-3.006	1.006
-3.005	1.005
-3.004	1.004
-3.003	1.003
-3.002	1.002
-3.001	1.001
-3	1
-2.999	0.999
-2.998	0.998
-2.997	0.997

$$8. \lim_{x \rightarrow 3} \frac{2x-6}{x-3} = 2$$



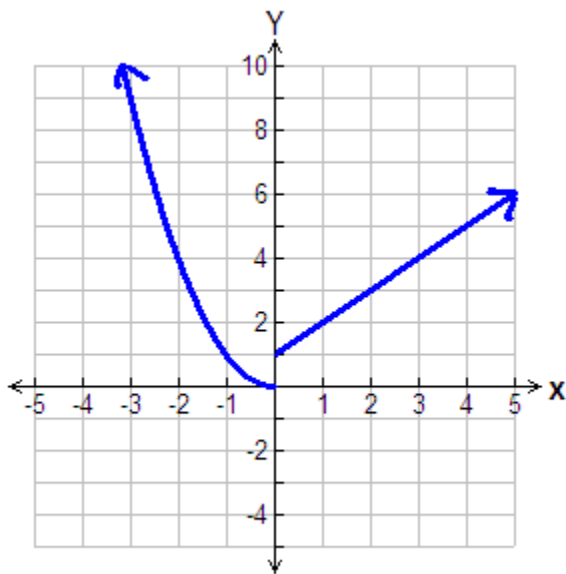
x	y1(x) (2x-6)
2.95	2
2.96	2
2.97	2
2.98	2
2.99	2
3	undef
3.01	2
3.02	2
3.03	2
3.04	2
3.05	2
3.06	2
3.07	2

9. $\lim_{x \rightarrow 4} f(x)$ where $f(x) = \begin{cases} x^2, & x \neq 4 \\ 0, & x = 4 \end{cases}$ $\lim_{x \rightarrow 4} f(x) = 16$



x	y1(x) f(x)
3.99993	15.9994
3.99994	15.9995
3.99995	15.9996
3.99996	15.9997
3.99997	15.9998
3.99998	15.9998
3.99999	15.9999
4	0
4.00001	16.0001
4.00002	16.0002
4.00003	16.0002
4.00004	16.0003
4.00005	16.0004

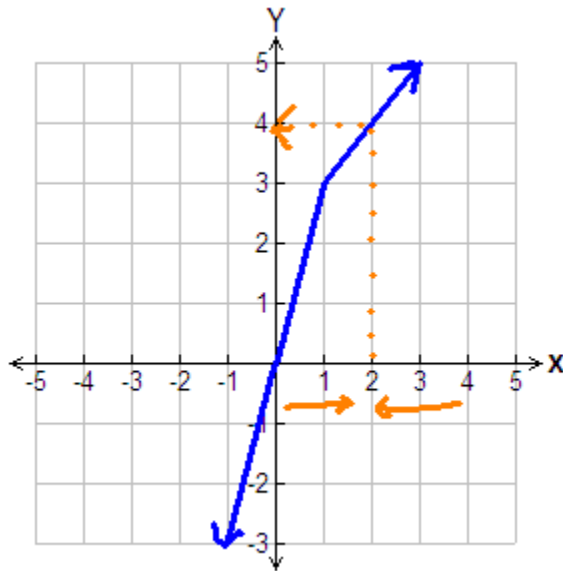
10. $\lim_{x \rightarrow 0} f(x)$ where $f(x) = \begin{cases} x^2, & x < 0 \\ 1 + x, & x > 0 \end{cases}$



10. $\lim_{x \rightarrow 0} f(x) =$ does not exist

11. $\lim_{x \rightarrow 2} f(x)$ where $f(x) = \begin{cases} 3x, & x < 1 \\ x+2, & x \geq 1 \end{cases}$

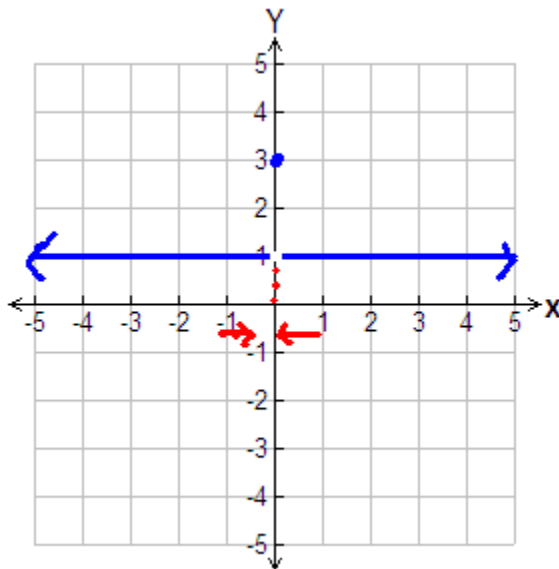
$\lim_{x \rightarrow 2} f(x) = 4$



x	y1(x) h(x)
1.995	3.995
1.996	3.996
1.997	3.997
1.998	3.998
1.999	3.999
2	4
2.001	4.001
2.002	4.002
2.003	4.003
2.004	4.004
2.005	4.005
2.006	4.006
2.007	4.007

12. $\lim_{x \rightarrow 0} f(x)$ where $f(x) = \begin{cases} 1, & x \neq 0 \\ 3, & x = 0 \end{cases}$

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

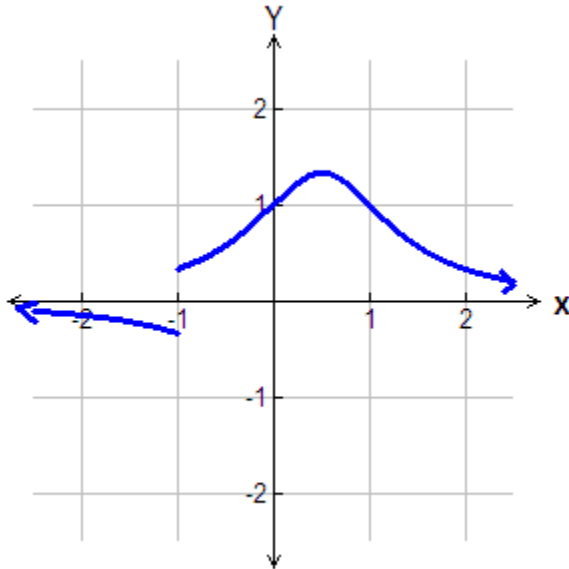


x	y1(x) k(x)
-0.005	1
-0.004	1
-0.003	1
-0.002	1
-0.001	1
0	3
0.001	1
0.002	1
0.003	1
0.004	1
0.005	1
0.006	1
0.007	1
0.008	1

MTH 175/Knick
Solutions 1.2 Worksheet Limits Numerical/Graphical Analysis

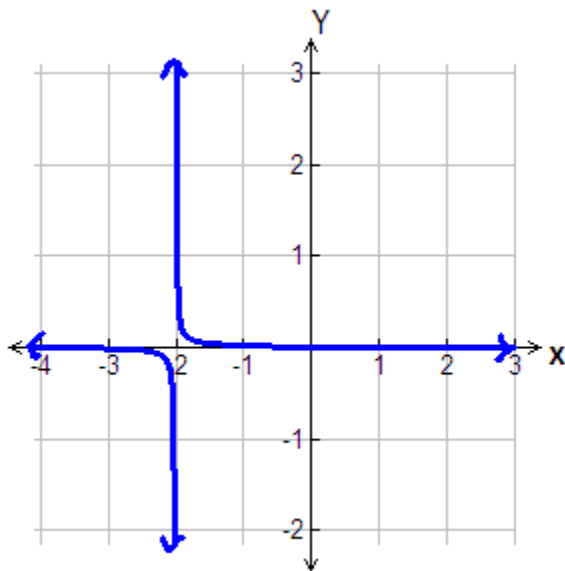
Use a graphing calculator to find at least one number c at which $\lim_{x \rightarrow c} f(x)$ does not exist.

13. $f(x) = \frac{x+1}{|x^3+1|}$



Jump at $c = -1$; therefore the limit does not exist as x approaches -1 .

14. $f(x) = \frac{|x|}{x^5 + 2x^4 + 13x^3 + 26x^2 + 36x + 72}$



Vertical asymptote at $c = -2$; therefore limit does not exist as x approaches -2 .