THE CHINESE UNIVERSITY OF HONG KONG
Department of Mathematics
MATH1020
Exercise 3
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Exercise 1 Find the limits:

(a) $\lim_{x\to 2^-} \frac{1}{x-2}$; (b) $\lim_{x\to 2^+} \frac{1}{x-2}$;
(c) $\lim_{x\to 2} \frac{1}{x-2}$; (d) $\lim_{x\to +\infty} \frac{1}{x-2}$; (e) $\lim_{x\to -\infty} \frac{1}{x-2}$.

x	1.9	1.99	1.999	1.9999	1.99999	1.999999	$\to$	$\cdots$
$f(x)=\frac{1}{x-2}$								

x	$\cdots$	$\leftarrow$	2.000001	2.00001	2.0001	2.001	2.01	2.1
$f(x)=\frac{1}{x-2}$								

x	1	10	100	1000	10000	100000	$\to$	$\cdots$
$f(x)=\frac{1}{x-2}$								

x	$\cdots$	$\leftarrow$	-100000	-10000	-1000	-100	-10	-1
$f(x)=\frac{1}{x-2}$								

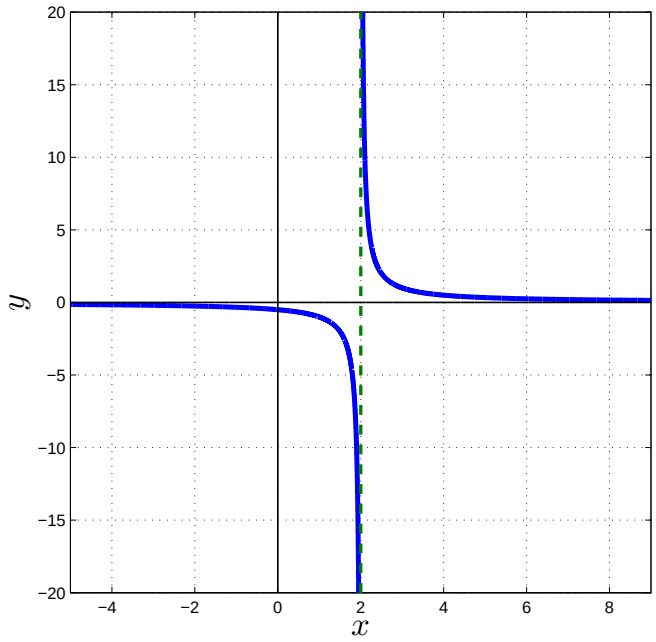

Figure 1: Graph of $y = \frac{1}{x-2}$, where $x \in [-5, 9]$.

Exercise 2 Find the limits:

(a) $\lim_{x\to -1^-} \dfrac{3x}{x+1}$; (b) $\lim_{x\to -1^+} \dfrac{3x}{x+1}$;

(c) $\lim_{x\to -1} \dfrac{3x}{x+1}$; (d) $\lim_{x\to +\infty} \dfrac{3x}{x+1}$; (e) $\lim_{x\to -\infty} \dfrac{3x}{x+1}$.

x	-1.1	-1.01	-1.001	-1.0001	-1.00001	-1.000001	$\to$	$\cdots$
$f(x)=\dfrac{3x}{x+1}$								

x	$\cdots$	$\leftarrow$	-0.999999	-0.99999	-0.9999	-0.999	-0.99	-0.9
$f(x)=\dfrac{3x}{x+1}$								

x	1	10	100	1000	10000	100000	$\to$	$\cdots$
$f(x)=\dfrac{3x}{x+1}$								

x	$\cdots$	$\leftarrow$	-100000	-10000	-1000	-100	-10	-1
$f(x)=\dfrac{3x}{x+1}$								

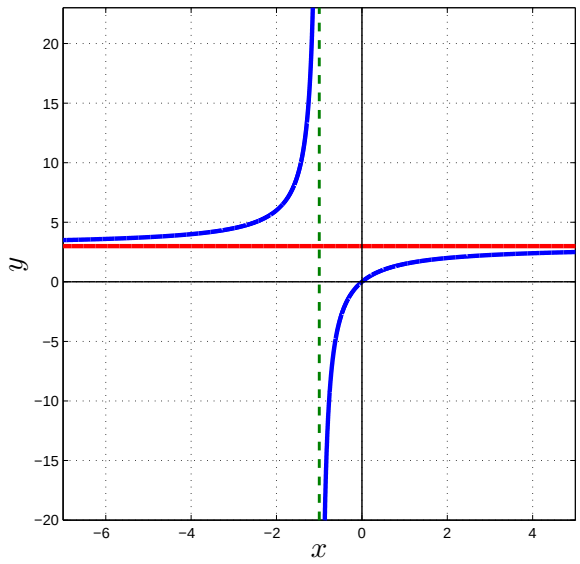

Figure 2: Graph of $y = \dfrac{3x}{x+1}$, where $x \in [-7, 5]$.

Exercise 3 Find the limits:

(a) $\lim_{x\to 0^-} \dfrac{x^2+1}{x}$; (b) $\lim_{x\to 0^+} \dfrac{x^2+1}{x}$;

(c) $\lim_{x\to 0} \dfrac{x^2+1}{x}$; (d) $\lim_{x\to +\infty} \dfrac{x^2+1}{x}$; (e) $\lim_{x\to -\infty} \dfrac{x^2+1}{x}$.

x	-0.1	-0.01	-0.001	-0.0001	-0.00001	-0.000001	$\to$	$\cdots$
$f(x)=\dfrac{x^2+1}{x}$								

x	$\cdots$	$\leftarrow$	0.000001	0.00001	0.0001	0.001	0.01	0.1
$f(x)=\dfrac{x^2+1}{x}$								

x	1	10	100	1000	10000	100000	$\to$	$\cdots$
$f(x)=\dfrac{x^2+1}{x}$								

x	$\cdots$	$\leftarrow$	-100000	-10000	-1000	-100	-10	-1
$f(x)=\dfrac{x^2+1}{x}$								

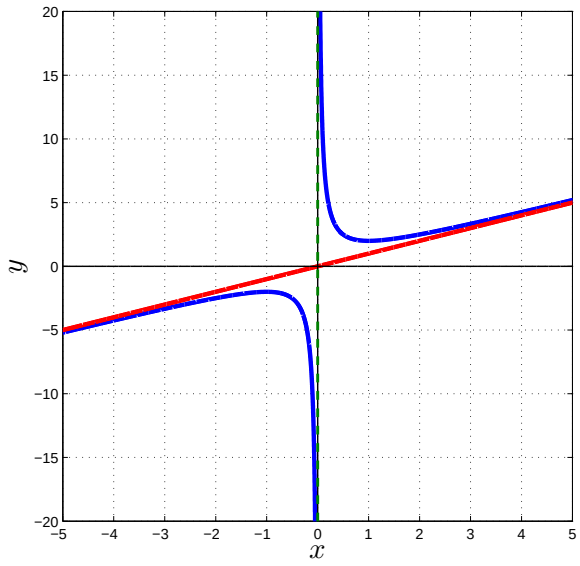

Figure 3: Graph of $y = \dfrac{x^2+1}{x}$, where $x \in [-5, 5]$.