Limits and Continuity

Chapter 2

You should be able to:

C1.1 *Using informal methods, explore the concept of a limit including one sided limits.*

C1.2 *Using informal methods, establish that the limit of* $\frac{1}{x}$ *as* x *approaches infinity is zero.*

The Limit of a Function

Sect. 2.1

If *f(x)* can be made arbitrarily close to a finite number *L* by taking *x* sufficiently close to but different from a number *a*, from both the left and right side of *a*, then

$$\lim_{x \longrightarrow a} f(x) = L$$

This is read " the limit of *f of x*, as *x* approaches *a* is *L*"

* The function does not have to be defined at *a*.

Limits Using Tables

- Consider the function $f(x) = 3x - 1$

Determine the behaviour of *f(x)* as *x* approaches 2

x	1.9	1.99	1.999	2	2.001	2.01	2.1
f(x)							

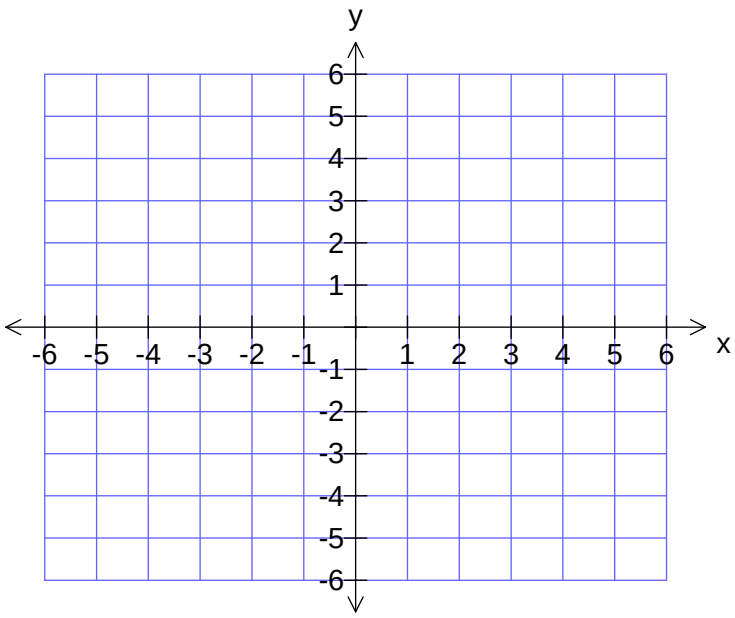
Determine the behaviour of *f(x)* as *x* approaches 1 for the function:

$$f(x) = \frac{x^2 + 2x - 3}{x - 1}$$

x	0.9	0.99	0.999	1	1.001	1.01	1.1
$f(x)$							

$$f(x) = \frac{1}{x}$$

x	-5	-1	-0.5	-0.25	0	0.25	0.5	1	5
$f(x)$									



What value is *f(x)* approaching as *x* becomes a larger positive number?

What value is *f(x)* approaching as *x* becomes a larger negative number?

Will the value of *f(x)* ever be zero? Explain…

Homework

- Use a table of values to estimate the limit of each:

- 1. $y = (x+3)^2$ as x approaches -1

- 2. $y = \dfrac{2}{x+5}$ as x approaches -5

- 3. Use graphing technology to estimate the the limit of each as x approaches infinity.

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(i) $f(x) = \frac{2}{x}$

(ii) $f(x) = \frac{10}{x}$

(iii) $f(x) = \frac{100}{x}$